Plane Talk

APRIL · 1943

HE LIBERATOR EXPRESS

Our Job is Building Airpower . . . . . *by Tom M. Girdler*

Bombing the Japs at Kiska . . . *by Lieutenant Nelson M. Drake*

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Plane Talk

PUBLISHED BY CONSOLIDATED VULTEE AIRCRAFT CORPORATION

Front Cover

The Liberator Express

This plane, in volume production on mechanized assembly lines at Consolidated Vultee in Fort Worth, has a loaded weight (including crew, gas, cargo) of around 28 tons. For news of its use in our global war, read "To India's Coral Strand".

Back Cover

Liberator Bomber over Grand Canyon

The Liberator bomber, like the Express, has a possible range in excess of 4000 miles. For a pilot's own story of a bombing expedition, read what Lieutenant Nelson H. Drake has to tell in "Bombing the Japs at Kiska."

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Edited by Hill and Knowlton for the Consolidated Vultee Aircraft Corporation. All text and pictures have been cleared for publication with Government authorities. Text may be reprinted with or without credit to Plane Talk. Copies of most pictures can be made available to editors upon request. While manuscripts are not solicited, first hand accounts of experiences by men in the air forces at the fronts will be given careful consideration. All correspondence in regard to articles, pictures, and Post Office changes of address should be addressed to Hill and Knowlton, 350 Fifth Avenue, New York.

Our Job Is Building Airpower

by Tom M. Girdler

WE now begin to see how victory is to be won.

At the end of this year we shall have an air force approaching 2,500,000 officers and men—over a hundred times larger than five years ago, and by all odds the world's largest.

To provide these men with planes, we shall have well over a million workers engaged in the aircraft industry, compared with a total of less than fifty thousand when Germany invaded Poland. The aircraft industry in value of output is now greater than the automobile industry ever was in its heyday.

The personnel figures show our airforce being multiplied more than a hundred times while the number of aircraft workers expands about 24 times, or less than a fourth as much. This reflects some of our progress. By mechanizing our aircraft plants and introducing mass production techniques, we are enabling a given number of workers to turn out many more planes than a few years ago.

In building Consolidated Liberators, for instance, we cut the man hours required per ship by two-thirds in less than a year.

Our country's average production of around 4,000 planes a month last year is being largely increased under current schedules. Contrast this with the fact that when we entered the war just 350 medium sized aircraft served our whole domestic airline system, and we have another measure of growth. We are already turning out more planes than all our enemies combined.

We are making them more powerful. While unit production of planes last year was being doubled, the horsepower of engines was tripled, and tonnage was quadrupled.

This is just the beginning of our progress. For example, Consolidated Vultee now has planned, to the point where they could be put into production, planes that will dwarf even the largest of the planes now in service.

When victory is won, we shall still need a margin of airpower to assure that peace will be maintained. This means a vital post-war task for our industry. An airforce that does not renew its planes every five years becomes obsolete. Hence our orders for military airplanes after this war may be expected to remain important.

In addition, we may expect unique developments in post-war transport for civilians. We shall have perhaps 200,000 trained pilots; many more mechanics trained for maintenance; a world dotted with American made airports; manufacturing organizations prepared to service planes everywhere.

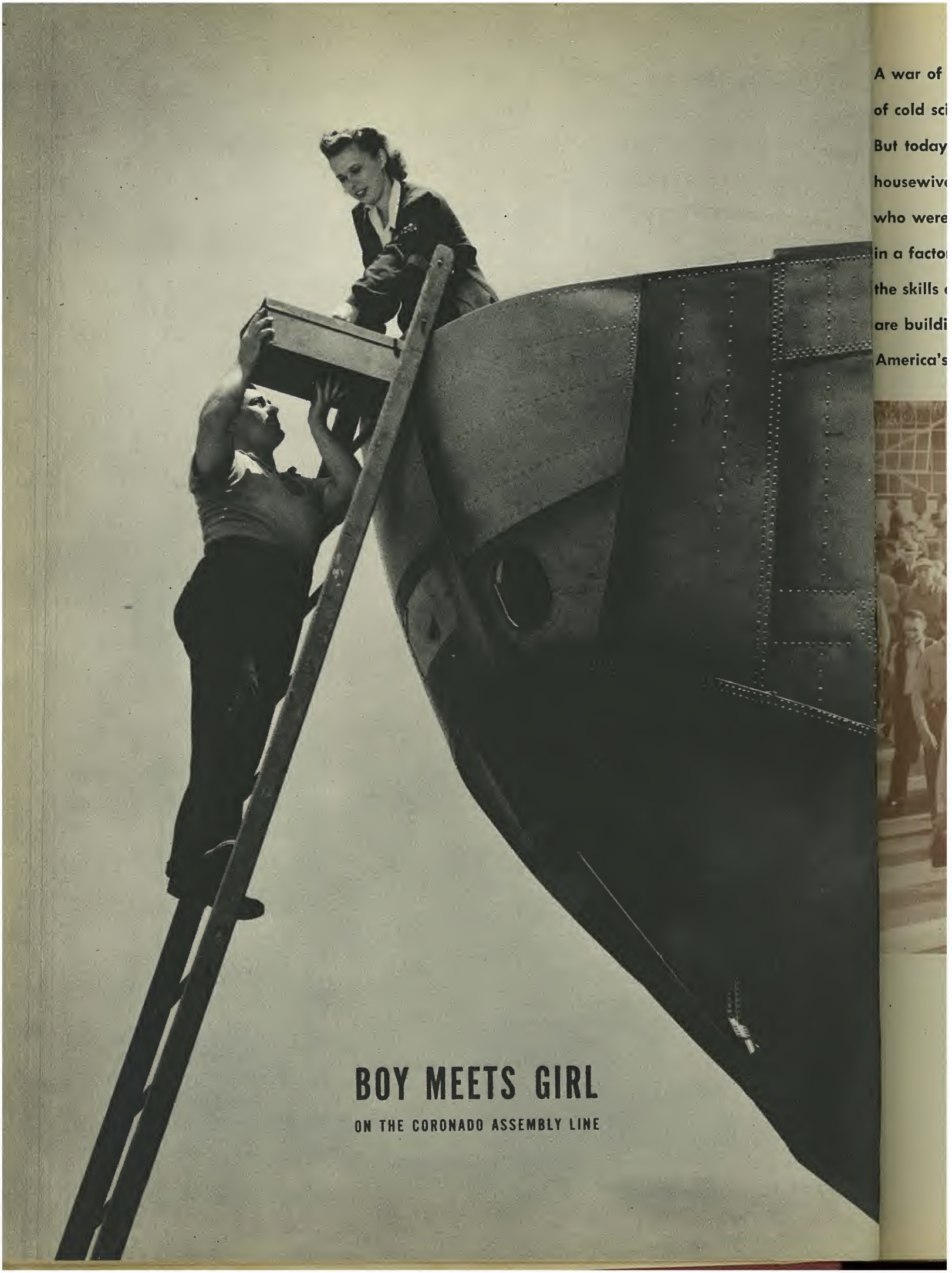
Further, there should be a large market for the family plane among the trained pilots the war has developed. The cost of operating small planes had already dropped from around $25 an hour to $3, when the present war started, and excellent light planes could be had for a price comparable to a moderately priced automobile. Under superior volume production methods, future costs should be still lower.

In preparing for this future our united organization has just one goal: to help in the work of keeping our nation great, by building airpower for victory and for peace.

Tom Girdler arriving in Fort Worth.

Tom Girdler speaks here as Chairman of the Board of the Consolidated Vultee Aircraft Corporation, created in March of 1943 when the stockholders of Consolidated Aircraft and Vultee Aircraft voted to unite their companies.

Plane Talk **now combines two periodicals—the Vultair magazine and the Consolidator monthly — as a medium for reporting on the work of Consolidated Vultee in helping build American air power. Its first issue is in your hands.**



BOY MEETS GIRL

ON THE CORONADO ASSEMBLY LINE

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A war of machines, of experts, of cold scientific skills, they predicted. But today grandmothers and housewives and old men and folks who were never before in a factory have acquired the skills and the science, are building America's victory.

SURE! IT'S THE *People's* WAR

IN San Diego there's one school in a great building left over from the San Diego exposition — another in a church — another even in a once-vacant store room. They're crammed with students the like of which has never been seen before.

Two grandmothers, one white haired, the other pink-cheeked and marcelled, bend together with compass and rulers over adjoining desks. They are both learning to be mechanical draftsmen, to turn out their share of the ten acres of blue prints required to build a single flying battleship.

"How on earth," you ask the Consolidated Vultee teacher, "do you manage to guess that a grandmother can learn some engineering, when she decides she wants to help in the war?"

"It's not so difficult at that," you are told. "First we look for evidence of artistic talent. Perhaps a woman has done painting, or drawing, or fine arts design. Per-

haps she laid a career aside to bring up a family. If she can draw, and if she is intelligent, we can easily teach her mechanical draftsmanship. She is straight on her way into the engineering department."

IN California, where the airframe industry of the nation centers, literally hundreds of thousands of people have gone to school, and are today at work doing precision jobs. Most of them were never before in a factory.

In an age that has been called revolutionary, here we have the real revolution.

The lure of war-time money is not enough to have done this. In San Diego, for instance, Consolidated early realized that the sort of workers needed must be appealed to on the basis of their patriotic willingness to serve.

San Diego is a crowded city. Housing is at a premium. To bring in more outside workers would only complicate the lives of those already there. Thus appeals are addressed to the wives, mothers, daughters, in families already sufficiently supplied with income. "Come and help us you don't need the wages you can still l war bonds." That is the essence of the m sage. More are still needed.

BUT how, one may ask, is it possibl take completely green workers teach them quickly to do precision wo

Walk into any one of the many scho and watch. Here, at one table, you will women busy with hack saws and pieces metal — just learning to saw straight. O there, at another table, you will see oth learning to bore holes. Still others are le ing to insert rivets—they put in rivets rivets and rivets, over and over again. these practiced-upon materials are c fully saved for the scrap pile; even rivets are extracted and re-used.

There are precious machines in t classroom, too — loaned from the prod tion line at the plant, so that emb workers can learn to run them. Stude mastering machine operations must t turns — there are never quite enou machines to go around.

Some of these schools run at night well as day. The old and the young — even some who are partial invalids — straight from these classes to the prod tion line.

The schools in San Diego are typical those that now dot all California and ma other parts of the nation. As an exam of cooperation between government industry, they are significant. Federal State educational funds are used to ma tain the physical facilities and administ tion. Instructors are experts usually tak direct from the aircraft production lin Consolidated Vultee plants have loan hundreds of employees to teach in co munity schools in nearby towns, from co to coast.

The student who goes through one these industrial training courses satisf torily is practically assured in advance o job. He need only walk into the emplo ment office carrying evidence of his citiz ship. He will be on the production li even before his fingerprints have been se on to Washington — as they always a by the plant protection service.

No matter how short the period of tra ing, its graduate will enter Consolida Vultee equipped for a special job. T results from the close coordination betwe the training schools and the methods u

Remember when folks past forty were supposed to be out of the running? Today they are a force in the aircraft industry, are welcomed for industrial training.

by product agers were stepping up and trainin they comp tion proces of job sim vellously c into 15 or 2 mitted trai expert at j short time.

TODAY mo women. ing undoub an experin the new w Diego disc other work covers that routine, an of its way If she h question to go to a fore who assists form she when it wa at her job, modified t her streng News c spreads qu count for t women wh

by production management. When managers were faced with the necessity of stepping up aircraft production overnight, and training thousands of workers to do it, they completely reorganized the production processes. Part of their work consisted of job simplification. In some cases, marvellously complex jobs were broken down into 15 or 20 different operations. This permitted training a new worker to become an expert at just one of these operations, in a short time.

TODAY most of the students, of course, are women. Those who first took the training undoubtedly looked on their venture as an experiment. But those days are over; the new woman trainee who works at San Diego discovers that 41 per cent of the other workers are women, likewise. She discovers that the work is interesting, even if routine, and that management has gone out of its way to make things pleasant for her.

If she has an embarrassingly personal question to ask, for instance, she need not go to a foreman; she can turn to the matron who assists him. Even the attractive uniform she wears received official attention when it was designed. If she uses a machine at her job, it has been studied and perhaps modified to make its operation suitable to her strength.

News of such management attitudes spreads quickly in a community, helps account for the steady flow into schooling of women who might otherwise be reluctant.

Tube bending is explained to three students in San Diego's Balboa Park School. Hundreds of feet of such tubing go into bombers — for example, see picture on page 18.

A CITY where citizens have responded to the need as in San Diego must eventually reach a saturation point in available workers. Foreseeing that day, Consolidated Vultee created small "feeder plants" up and down California, bringing work to people in their own communities. Training schools are established in small towns, and so far as possible the graduates are put to work nearby their homes.

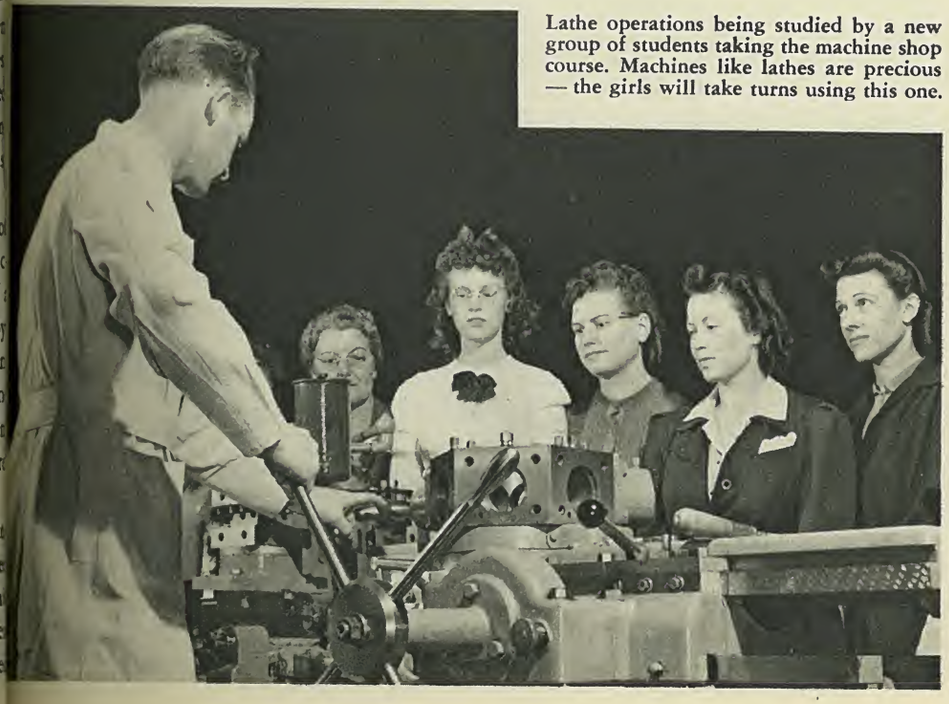
Expansion of Consolidated Vultee work in other states has also helped to distribute the load widely.

Whether in San Diego or Downey — Nashville or Fort Worth — Allentown or Miami — New Orleans or Tucson — the goal of all education for Consolidated Vultee work has been the same — to give new workers specialized skills in the shortest possible time.

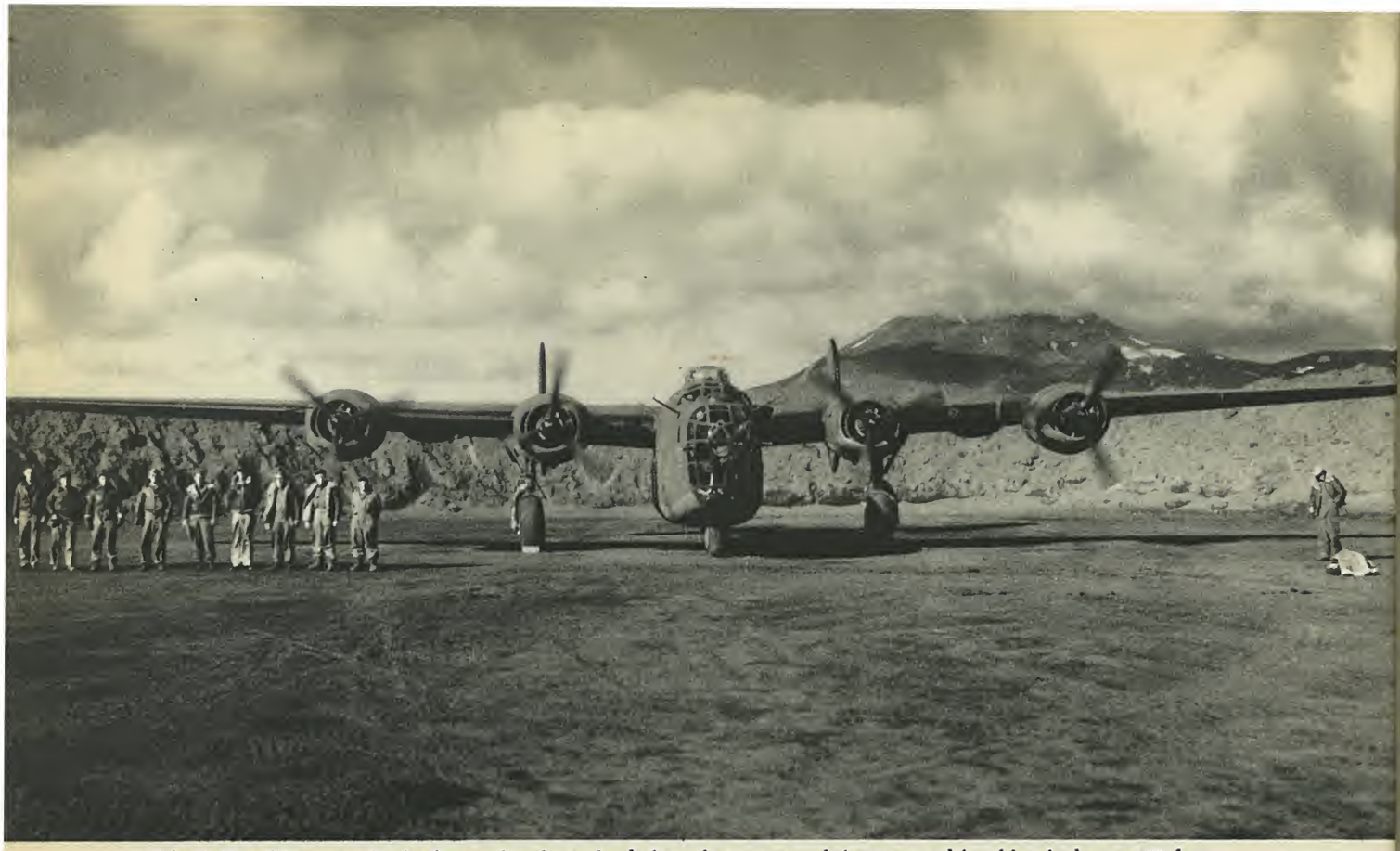
Training of recruits in the industrial schools is supplemented by further schooling after they have gone on the job. Every employee is constantly urged to develop higher skills by taking "up-grading" courses offered by the Educational Department. Still other courses are given selected workers for developing them into junior executives.

Recruits who can offer specialized skills obtained in previous work are often given a specialized training. At the new Allentown plant, for instance, men with engineering backgrounds in industries like construction and building are offered training designed to make them into aircraft engineers.

In such ways are amateurs learning to build the machine that is the climax of all our science, the airplane. This is an aspect of today's revolution that could not have been predicted. But it is one of the surest signs that this is really the people's war, and that the people intend to win.



Lathe operations being studied by a new group of students taking the machine shop course. Machines like lathes are precious — the girls will take turns using this one.



"Kiska Sal" and her crew in the far north, where clouds hang heavy most of the year, and bombing is done at 50 feet.

Bombing the Ja

Lieutenant Drake has been co-pilot on Liberator raids attacking the Japs at Kiska, and sinking Jap ships approaching America's North Pacific shores. He is a New Yorker, 28 years old, the son of Frederic Drake, publisher of Harper's Bazaar.

AFTER awhile it grew lighter; I could see the leadship plainly. No need now for the planes to fly so close. I pulled away a little. Then Mac took the controls. I could light a cigarette, loosen my safety, relax. My palms were wet and I rubbed them on the knee of my trousers.

We were headed for Kiska.

We were going to "pattern-bomb" Kiska at low altitude. You play watch-the-leader when you pattern bomb. He opens his bomb-bay door; you open yours. He drops his bombs; you drop yours. The leadship's bombardier aims for all the other planes in the formation.

You're careful with your fuses in low bombing. You delay the explosion of the demolition bombs, to give your plane a chance to get away. Otherwise you'd be blown out of the air. With fire bombs it doesn't matter. Our formation of Liberators had both on board. We were going in at 50 feet. Less if we had to.

OUR CREW–McWilliam's crew–had been operating Flying Fortresses. Then three crews from our outfit were transferred to Liberators. Our crew was one of those chosen. We liked the idea. We had to go back to the mainland for taking lessons. That first day we made mistakes. Once when we landed, we must have bounced twenty feet in the air. I thought we'd cracked the landing gear. It was terrific.

Then after a couple more landings, we got pretty good. Next morning we loaded our Liberator with men, suitcases, supplies, and headed back west. "Kiska Sal" roared down the runway, got us back home in four hours and a half.

Below us, as we made our landing proach, lay our "advanced Aleutian b tents dotted with occasional round top and wooden buildings. Our own settlem of bomber men is fortunate in living q ters. We're housed in quonset huts poker game was going on in the far en our hut as we entered.

The gang grouped around us, wai to collect their cigarettes, candy, bo we'd brought.

"Say, Mac," said pilot Hetrick open some mail we brought, "Have you chec tomorrow's schedule yet?"

"Hell no. Am I flying?"

"You're flying all right. Kiska. Brie is at 6 A.M."

"HEY DRAKE, snap out of it," nudged. "There's Kiska!"

I sat up, tightened my safety belt. Ah the sun broke through overhanging cl on a snow-capped volcano. We had c

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close to the water. The engines roared.

"Lower, men, lower," said Mac quietly. It's harder for the enemy to see you when you're low. Now we were almost on the tops of the waves. Whissh! We were spotted. About a half mile ahead great geysers of water sprang up. The Japs were firing.

Lower we flew, ten feet maybe, twenty at the most. Straight through the harbor. Tracers from the bluffs came from either side. Tracers from the Jap ships ahead whizzed by our nose.

Our own guns spat and rattled in reply. Vibration from our top turret cracked the glass in my side window.

The bomb-bay doors of the leadship opened.

"Bomb-bay doors opened," I yelled. All the other ships opened theirs. The formation tightened, evened up their wing tips. . . . This pattern must be good. The closer we flew, the more concentrated our bombing. I glued my eyes to the belly of the leadship—its bombs would drop any second now. Ahead I could see the camp area. Now docks, warehouses, barracks, mess halls, tents, were almost beneath us.

"Bombs!" I screamed, as the leader's charges began to drop. But our bombardier had seen them first. Even as I yelled I could see the explosions beneath us, feel the heat of the fire bombs pouring up through the opened bomb doors. A sea of smoky flame began spreading, flowing over all the target. It seemed bombs had dropped everywhere. Every ship in the formation had unloaded at once. The delayed explosion began behind us. The noise was incredible.

"Bombs away," said the bombardier over the interphone. He slowly closed our doors. We were flying low through a valley toward the other side of the island to turn eastward, head home.

We settled back in our seats, turned on the radio. WJZ, with a jazz band. Still morning in Alaska. Music for tea dancing from New York.

Jap Kiska

by Lieutenant Nelson H. Drake

Recently released picture of Liberator bomber showing tail and turret guns.

Quonset huts make snug housing in the Aleutians.

Interior of hut. Note sleeping bags and pot stove.

Three 500-pound demolition bombs to be loaded.

The author reports to Scotty, the squadron's pet.

**The new Sentinel, called the Flying Jeep,
can almost leap into the air,
has the versatility of the ground jeep in action.
It can take off from nowhere, needs little servicing,
consumes a minimum of gas, is altogether
the sort of plane many a young fellow would like to have
in his own garage — someday.**

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NOW coming into the hands of the Army is a new plane called the Sentinel or Flying Jeep, produced by Consolidated Vultee's Stinson Division to do a significantly specialized job. It illustrates how far aircraft engineering has come in developing ability to create a plane to meet a carefully defined need.

In the memory of millions now living, the engineering problem was originally just to create a plane that would fly at all. Then emphasis was put on safety – on developing designs that would take undue risk out of flying. Nowadays flying hazards are overwhelmingly based on human and not mechanical factors. Today, the engineer is free to concentrate most of his interest on creating planes that will act in pre-determined ways to meet given aviation requirements.

THE Sentinel is an illustration. The need has been for a plane that could act as the eyes of the ground troops. It would have to go anywhere they could go–hence it would require the ability to take off from almost any kind of ground. Further, it would have to take off after a very short run, climb rapidly at a sharp angle. For open clearings in wild country are often scarce, and are surrounded with many hazards.

Further, such a plane should be fast, yet be able to maintain flight at very slow speeds, so that it could hover in the air over an objective to be observed. It would thus perform the work of an observation balloon, with the advantage of making a quick getaway and avoiding becoming a fixed target for enemy fire.

The L-5 Sentinel (L is the Army designation for Liaison plane) was born to meet such exacting specifications. Carrying a pilot and an observer, it is packed with radio equipment that gives two-way communication with ground troops and other planes. It is designed for unusual stability in the air, so that the pilot can concentrate on observation without fearing inadvertent stalls or spins.

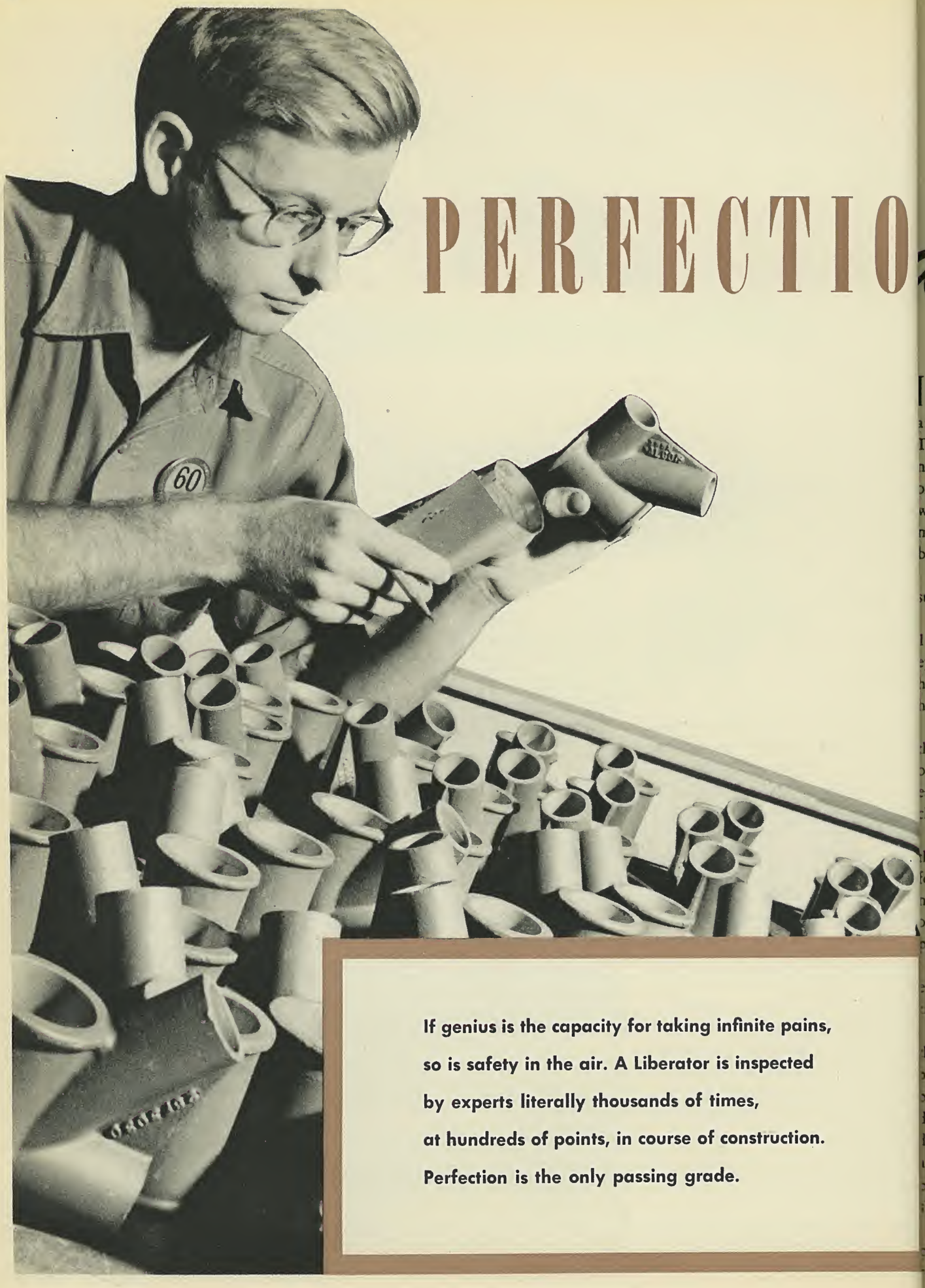
It can spot targets for ground troops, or spy out enemy action and give immediate report. It can direct artillery fire while hovering at only 45 miles an hour, then soar away at an unusually fast speed.

In exposed country, it can be easily pushed around by its crew and hidden under trees, just like the auto jeep. Its small 34-ft. wing span, being one-third less than that of the Stinson L-1, pioneer plane of this type, gives it access to small glades for shelter. Its 190 horsepower Lycoming engine is also smaller than that used in the L-1, and requires comparatively little gasoline or service work. This is important on distant battle fronts. Skis can be mounted on the plane's landing gear, for use in snow. It will carry a loaded stretcher, so that it can rescue wounded men fallen far from their lines.

EVEN in construction, the Stinson Flying Jeep is built to meet prescribed conditions. In a period when metals of almost all kinds are precious, almost 70 percent of the aluminum that would ordinarily have been used was eliminated. Wings and tail surfaces are of wood.

As evidence of the skill with which manufacturers can now produce specialized aircraft to order, the Flying Jeep will suggest numerous post-war possibilities to those following aviation developments.

In opposite columns you see the Stinson Jeep at three consecutive moments, as it takes off and climbs. Here you observe it from another angle, climbing almost vertically upward after a short take-off run.



PERFECTIO

If genius is the capacity for taking infinite pains, so is safety in the air. A Liberator is inspected by experts literally thousands of times, at hundreds of points, in course of construction. Perfection is the only passing grade.

double checked

IF just one expert had the job of inspecting all the vital points in a battleship of the air, it might take him about three months. That battleship has around 102,000 parts, not counting rivets, nuts and bolts. Every one of them must be examined; and the whole ship, when finally ready for action, must still be gone over inch by inch again, before it may wing into its element.

There are no service men for roadside stops in the skies.

In one single Liberator factory, over 1500 trained inspectors focus unfaltering eyes on the production process. Each man, heavy with responsibility, holds life in his hands.

A special lingo has been developed on the inspection line, and inspectors' talk can often sound as much like Greek, to the ears of an untutored listener, as does the chant of the tobacco auctioneer.

When a given airplane part has been through the inspection mill and found perfect, for instance, the inspector says, like as not, "I'll buy it," then stamps his Okay on the "Traveller," a card attached to the part as it moves on its way.

Here is the way the foreman of the welders at Vultee Field might talk about inspection to a new man in his department:

"We don't want any Joe McGees here," the foreman — otherwise called puddle pusher — might say. "You gotta be on the beam or they won't buy your stuff on the drag line. Every time some shoemaker drops his stinger and arcs a tube, it means another rod burner has to spend an hour pickin' up the butch or it hits the squawk sheet."

If the new arrival had brought an interpreter, he might arrive at the following rough translation:

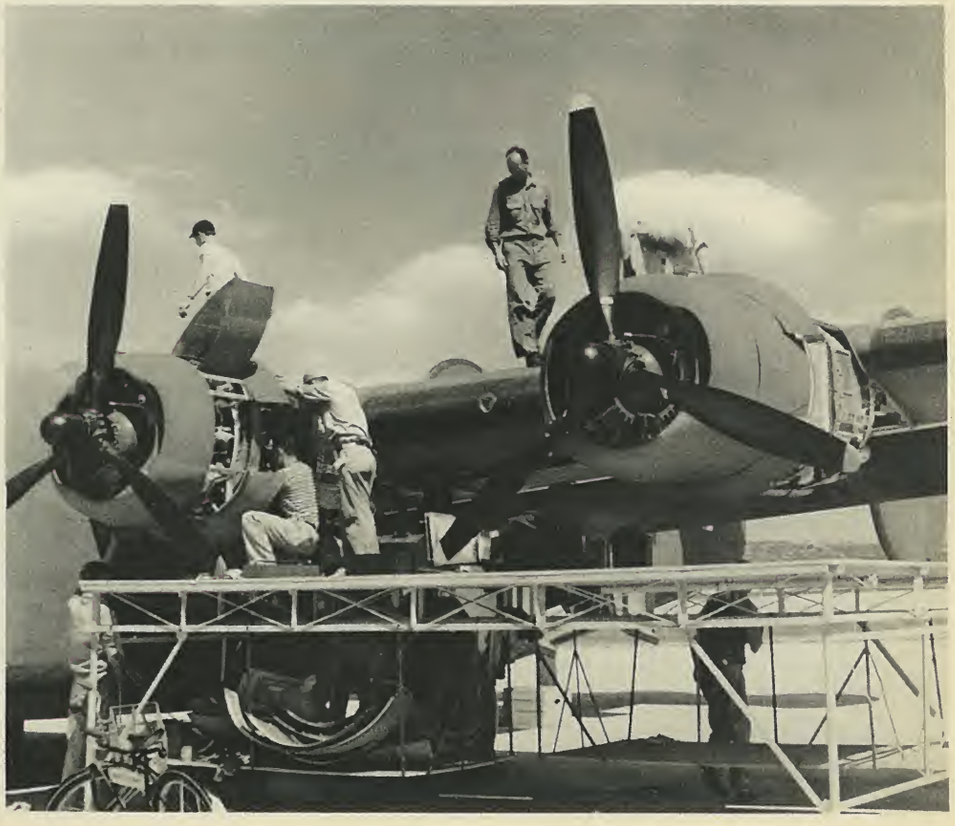
"We don't want any careless workmen here. You must be accurate or your work won't be passed on the final inspection line. Every time some clumsy workman drops his electrode holder and burns a hole in the tubing, it means another welder has to spend an hour correcting the fault, or it will be listed on the complaint sheet."

As such instructions would indicate, the job of building perfection into Liberators starts not with the inspector, but right at the beginning of parts fabrication. Every worker, every leadman and foreman, is trained to guard against faulty workmanship and error.

How are inspection experts developed, with qualifications for the exacting work? Here is Don De Marce speaking, Chief of Inspection in the Consolidated Vultee plants at San Diego:

"Once we demanded aircraft experience in our inspectors; plenty of it. But with production for war, we had to go outside the aircraft field for people we could train. We looked for workers with at least one to three years' college work in engineering, or graduates of an intensive school. Out of 1100 we trained, about 20 per cent failed. Each student was taught one or two jobs, no more. In this way we made specialists

Final check-up of a Liberator Express, preparatory to its test flight, in the yard at Fort Worth.



on thousands of aircraft installations."

All Consolidated Vultee inspectors, checking up on workmen, in turn are followed by a corps of Army and Navy inspectors, who "spot check" previous inspection work on every plane, before accepting delivery in the name of the Air Forces.

NO PHASE of inspection is "most important." An airplane, like a chain, can be no stronger than its weakest link.

As the sheets of dural metal, the raw materials, the parts built by subcontractors, come in on the receiving platforms, Receiving Inspection gives them their original third degree. When the sheet metal department turns raw material into some plane parts, inspection must write another "Sold" before they can move further. Indeed, these parts are not "buttoned up" — joined permanently — until the Inspector has given his Okay; this avoids any need of tearing a plane apart again to correct an error.

When the sub-assemblies are made part of the airplane on the final assembly line, actual written records, called "clean-up sheets" in the inspection book, accompany the plane on its way. After a worker at a given station puts in a hydraulic connection, or installs a motor bracket, he signs the sheet to show the job was done. Then the inspector checks it, adding his stamp.

Thus each installation and thousands of joinings all have a recorded history that is filed for future reference when the completed ship moves off the line.

Even now inspection isn't finished. In the Field Operations area, you will see signs warning off everyone, even employees who do not have specific passes to enter.

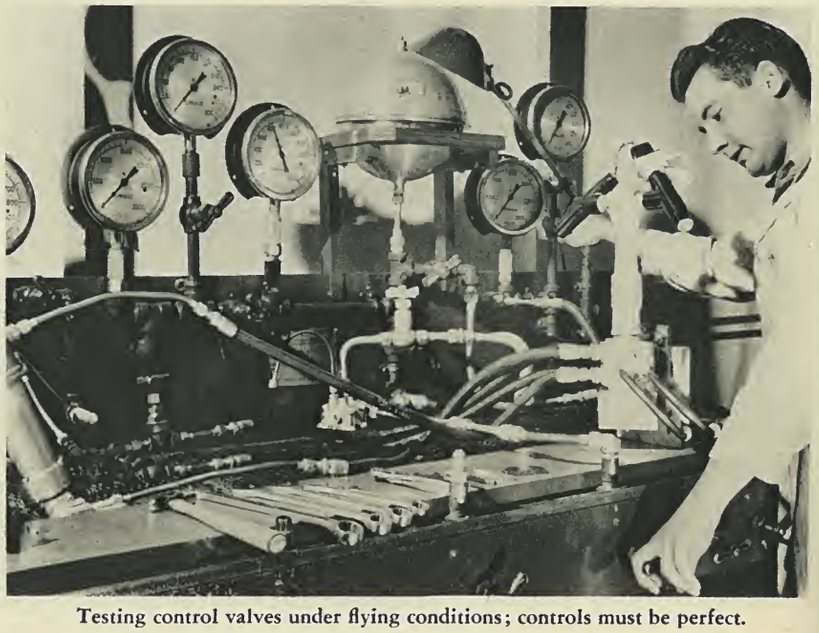
Here a complete over-all check of the finished airplane, including operational ground check of engines, is made. And again, before the ship is flown into service, it gets a final pre-flight and safety check inspection of operating mechanisms.

This system of assuring perfected perfection in all Consolidated Vultee ships helps account for the fact that today's air accidents are in almost every instance to be attributed to human factors, not mechanical failure.

It is the human factor that the Training command of our Air Force concentrates on seeking to eliminate as a cause of failure. The problem is to make men as faultless under stress as men now make machines.

Women inspecting small parts for Liberators wear "I" on their sleeves.

Each of the 102,000 parts is inspected by trained experts several times.



Testing control valves under flying conditions; controls must be perfect.

"Vengeance Dive Bombers are now in active combat on what we must call the Shangri-la front, causing destruction of enemy fortifications and replacements."

G. M. Williams, Assistant to the Chairman of the Board, Consolidated Vultee Aircraft Corporation.

V...—Also Means Vengeance

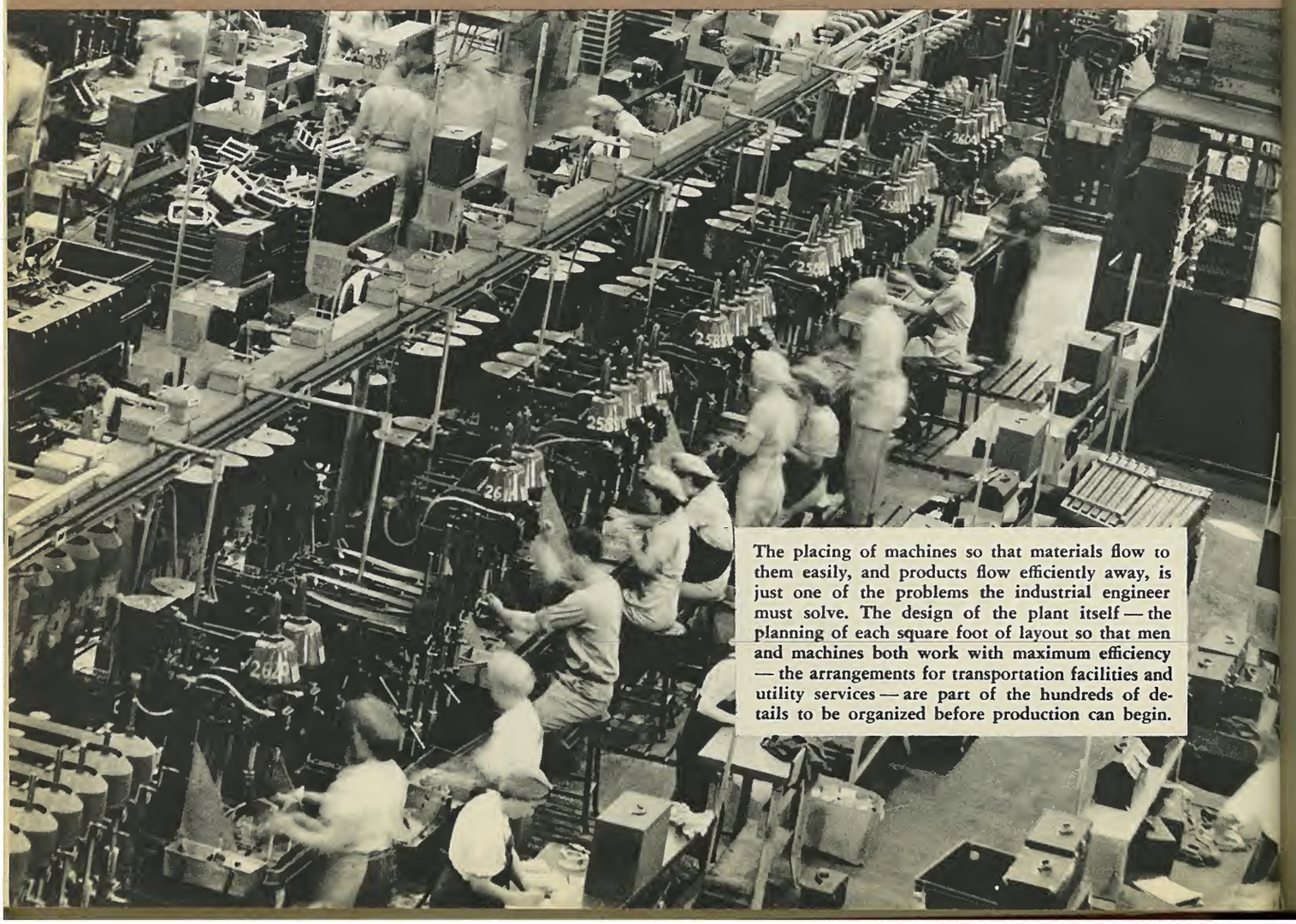
Part of the Vengeance assembly line at the Consolidated Vultee Nashville Division.

THE dive bomber, always a specialized weapon, was an American origination. But the Germans made it famous. Only now, after comparatively late recognition, are United Nation fronts beginning to get dive bombers in quantity.

The dive bomber, just because it performs a special job, will seldom be in the news month in and out. It will be there when strategy demands the weapon — as, for instance, in completing the dislocation of retreating land forces.

The Vengeance is a savage weapon, a two-seater plane equipped with 1600 h.p. Wright "Double Cyclone" engine, and carrying a capacity load of 2,000 pounds. It is in volume production on mechanical assembly lines at Nashville, Tennessee.

GOOD PLANNING is the Production Secret



The placing of machines so that materials flow to them easily, and products flow efficiently away, is just one of the problems the industrial engineer must solve. The design of the plant itself — the planning of each square foot of layout so that men and machines both work with maximum efficiency — the arrangements for transportation facilities and utility services — are part of the hundreds of details to be organized before production can begin.

AN INTERVIEW WITH
A. J. Brandt

THE Government handed Consolidated a rush order to open a plant in New Orleans and produce $40,000,000 worth of patrol bombers there for the Navy. Vultee got an order to equip an $11,000,000 plant immediately in Allentown, Pennsylvania, and start on a $100,000,000 contract for Navy Torpedo bombers.

The planning and design of the plants for this work will largely determine the efficiency and speed of the production that follows. A. J. Brandt is one of the first men to go out on the job and start the new assignment. Mr. Brandt is Senior Partner of his own engineering firm in Detroit, in addition to being a Director of Consolidated Vultee Aircraft Corp. and Special Engineering Consultant to Tom M. Girdler.

WHEN you ask A. J. Brandt what he considers most fundamental in factory design to achieve volume production, he will probably speak to you of *movement.*

"Manufacturing" he says, "must be considered as the movement of materials. True, the materials change form; one piece is added to another; finally the assembly is complete. But movement is the underlying essential that links the whole process.

"Now, the oftener you pick up a piece of material and lay it down, the more the product costs. For each handling takes time, labor and facilities.

"This means we should eliminate the use of stockrooms, wherever possible. To store raw material, drawing it out to perform a few operations, and then storing the processed part again until assembly, is wasteful. It makes for extra operations. It can be avoided by keeping material and parts on the move from one department's operations to another's, until finally assembled. Wherever possible, parts and sub-assemblies should be moved direct to the final assembly line."

This is the principle followed in assembling the Liberator. At various stations along the final assembly line are "bays", where the parts to be installed on a plane at that particular station are delivered immediately upon fabrication. They are kept here until they can be added to the plane in the minimum number of hours.

Simplifying the work is another essential of good planning. Says Mr. Brandt:

"We must simplify the processing, so that workers are made responsible for mastering only one or two operations. The length of time needed to train them, and to get into full production, is thus materially reduced. Proper planning will enable you to draw an organization chart to show just what personnel are required at the proper time at each station, and the training they need to do the job there.

"To make what we call a 'true' layout of the factory, small scale models of the various parts and assemblies are used, to show the proper relation of floor space required in each department. These departments are so located, with reference to each other, that a minimum of travel is required to get a part or sub-assembly from one operation to the next one. After the departments are laid out in this way, the architect can design a building to cover the operations. Sometimes, of course, the layout must be juggled to fit existing buildings. But the principles of good planning still apply."

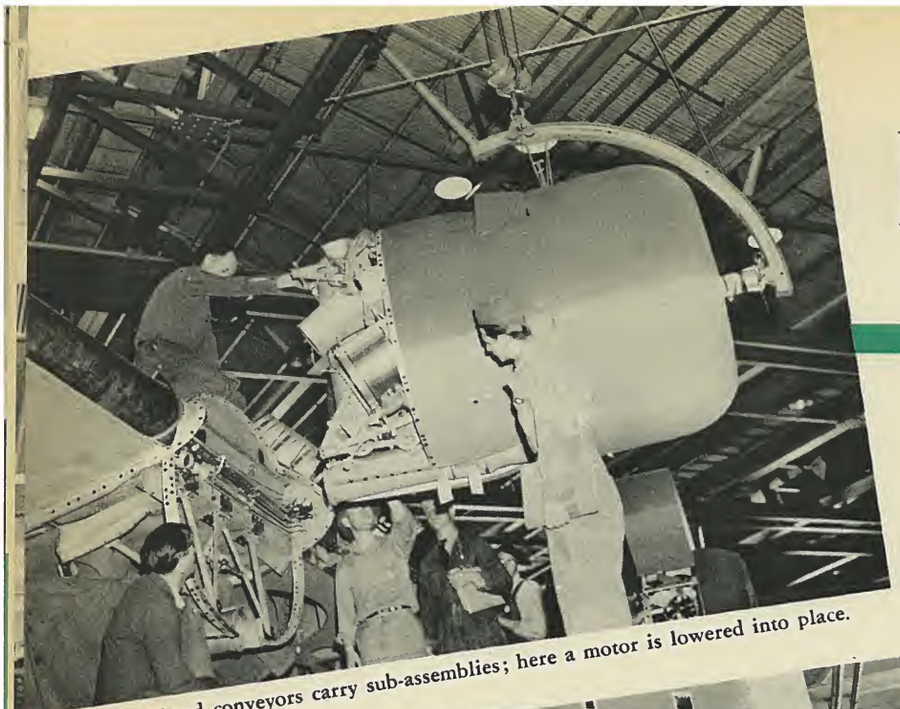
THE planning of an aircraft factory for low-cost high quality production actually starts as soon as the preliminary design of a plane is completed, and planning for production starts. It is at this point that the production and tooling engineers look over the models and drawings, and determine just how the various parts should be designed to make for ease in manufacture and assembly.

"Proper study at this time," says Mr. Brandt, "will eliminate more man-hours in the factory than you can achieve in any other way. One such study reduced the man-hours on one important assembly for Liberator bombers to only 17 percent of the time required by the old method.

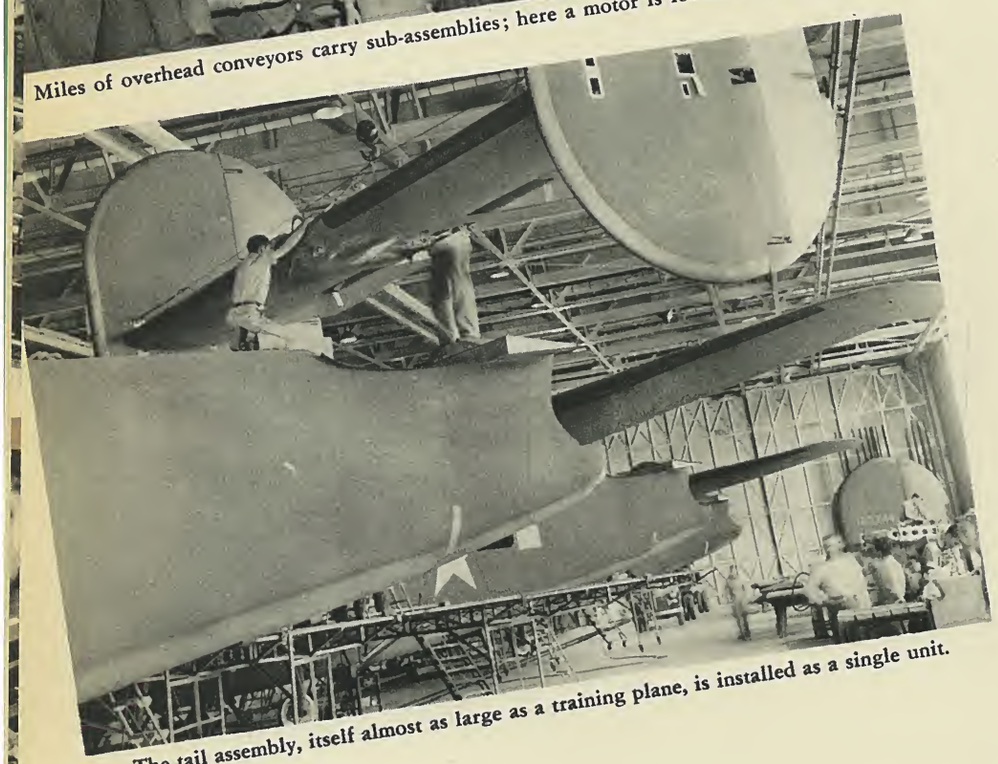
"In such factory planning lies the secret of much of the success attained in building superb planes in mass production. All of this planning, however, is dependent on the daring and ingenuity of the plane designers. For their work is the keystone of any and all success the planes will have in tactical use."

Exact scale reproductions of equipment in use at Consolidated Vultee to determine planning.

Putting 17 Tons



Miles of overhead conveyors carry sub-assemblies; here a motor is lowered into place.



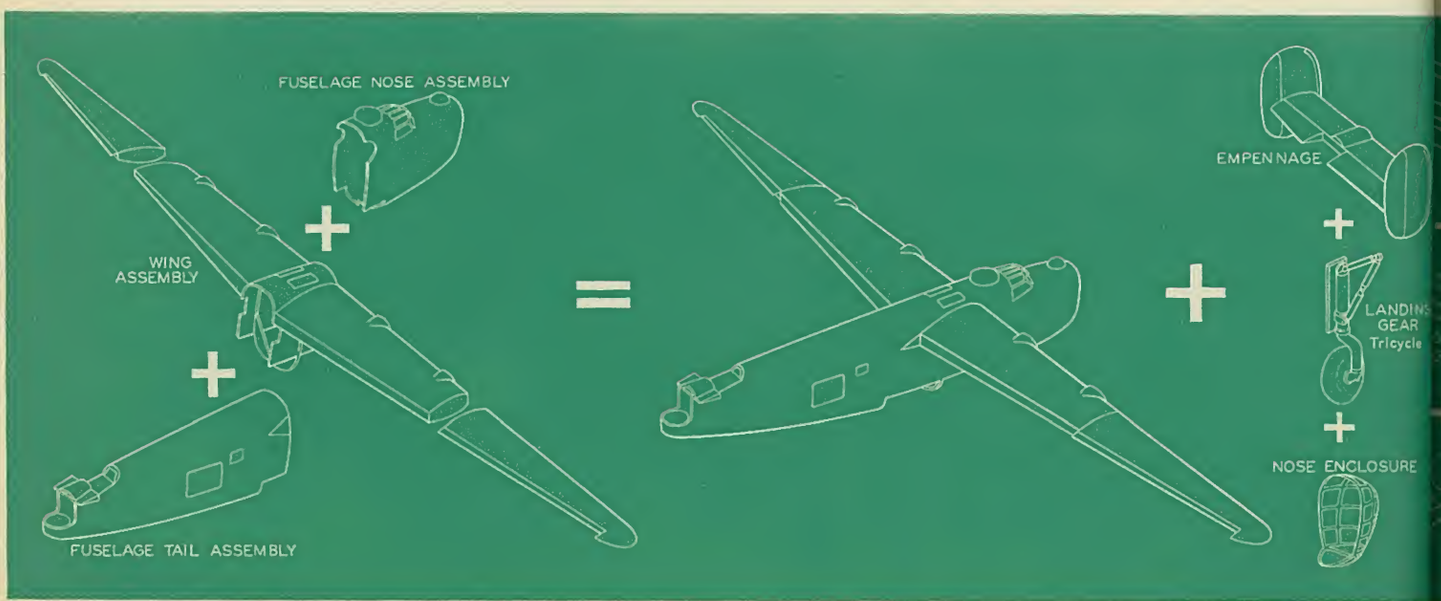
The tail assembly, itself almost as large as a training plane, is installed as a single unit.

WHILE the seventeen-ton Liberator is only a small indication of giant planes to come, it is still the largest bomber in volume production in the United States today. Its assembly on mechanized lines confounded experts who said it couldn't be done. The mechanization is a triumph of planning. For tooling and industrial engineers first had to break down highly complicated operations, calling for highly skilled craftsmen, into small, simple jobs which could be done by green hands.

Vultee first solved the problem of making small jobs out of big ones, saving years in the learning period. But Vultee established no precedent for conveyor lines for great bombers. Vultee was making only small planes, slightly larger than autos.

Here is how Harry Woodhead, Consolidated Vultee President, has described the problem of mechanizing bomber production:

"When we undertook volume-production in airplane building, two courses of action were possible. First, we could have kept on with the old custom building system — merely enlarging it, pulling more workers into more floor space, and increasing equipment, all in direct proportion to the number of airplanes we wanted to



Tos of Science Together

Harry Woodhead, President of Consolidated Vultee Aircraft Corporation.

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build. Or—second—we could revolutionize the old production system; plan our factory layout to eliminate lost motion of men and to speed up flow of materials; increase use of tools and machinery; cut down man-hours per unit. We chose this latter course.

"Here are the results. In the nine months ending January, 1943, there has been an increase of just about 10 percent in the number of workers at San Diego. But — we are now able to produce 2.3 planes for every one plane we produced in April. During the whole of 1942, man-hours needed to produce the Liberator were reduced more than 60 percent."

The final assembly line at the San Diego plant, typical for Consolidated Vultee operations, illustrates how some of these results were achieved.

This line is really an oval track, on which partly finished planes travel the whole length of the assembly plant and back again, as the work is completed.

No labor is done on this final assembly line that can be done previously. All the main sections of the Liberator are fabricated in advance, as "sub-assemblies", before they ever reach the final line. The fuselage, for instance, is made up in two parts, called the "fuselage tail assembly" and the "fuselage nose assembly." The first step on the final assembly line is to bring these two sub-assemblies together with the center wing section.

FIRST to be mounted on the track is the center wing section, lifted there by an overhead crane. The next step in construction is to fit a "jig" over this. The jig is simply a metal form, made of pipe, used to hold parts in rigid and exact position while being assembled. If, as a child, your picture was taken by a photographer who put your head in a vise while you watched the birdie, you have had some personal jig experience.

With the wing in place, and fixed in the mating jig, the nose and tail sections are now put in the positions in which they will be riveted.

The mating jig stays with the developing plane until, riding on a carriage, it reaches the third "station" on the line — a station being merely a point where prescribed work is done. Planes on this assembly line do not move forward steadily, as on a belt. Instead, they pause at each station for a certain period, after which the line moves on again.

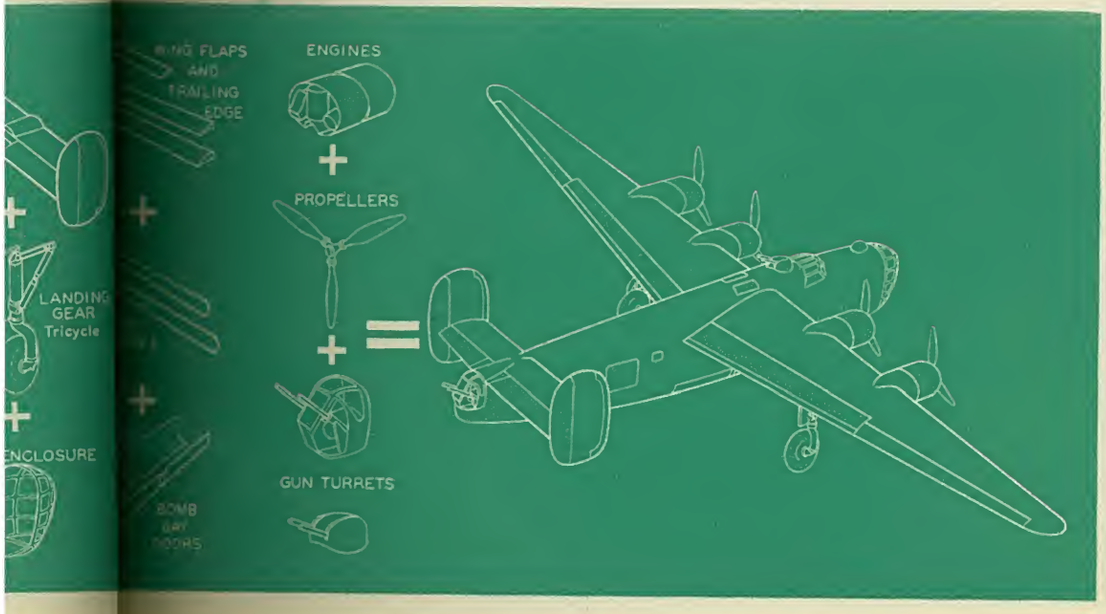
By the time the plane has reached the third station, there have been added bomb-bay side panels, bomb-racks, cat-walk and bulk-head segments, and upper decks over the wings.

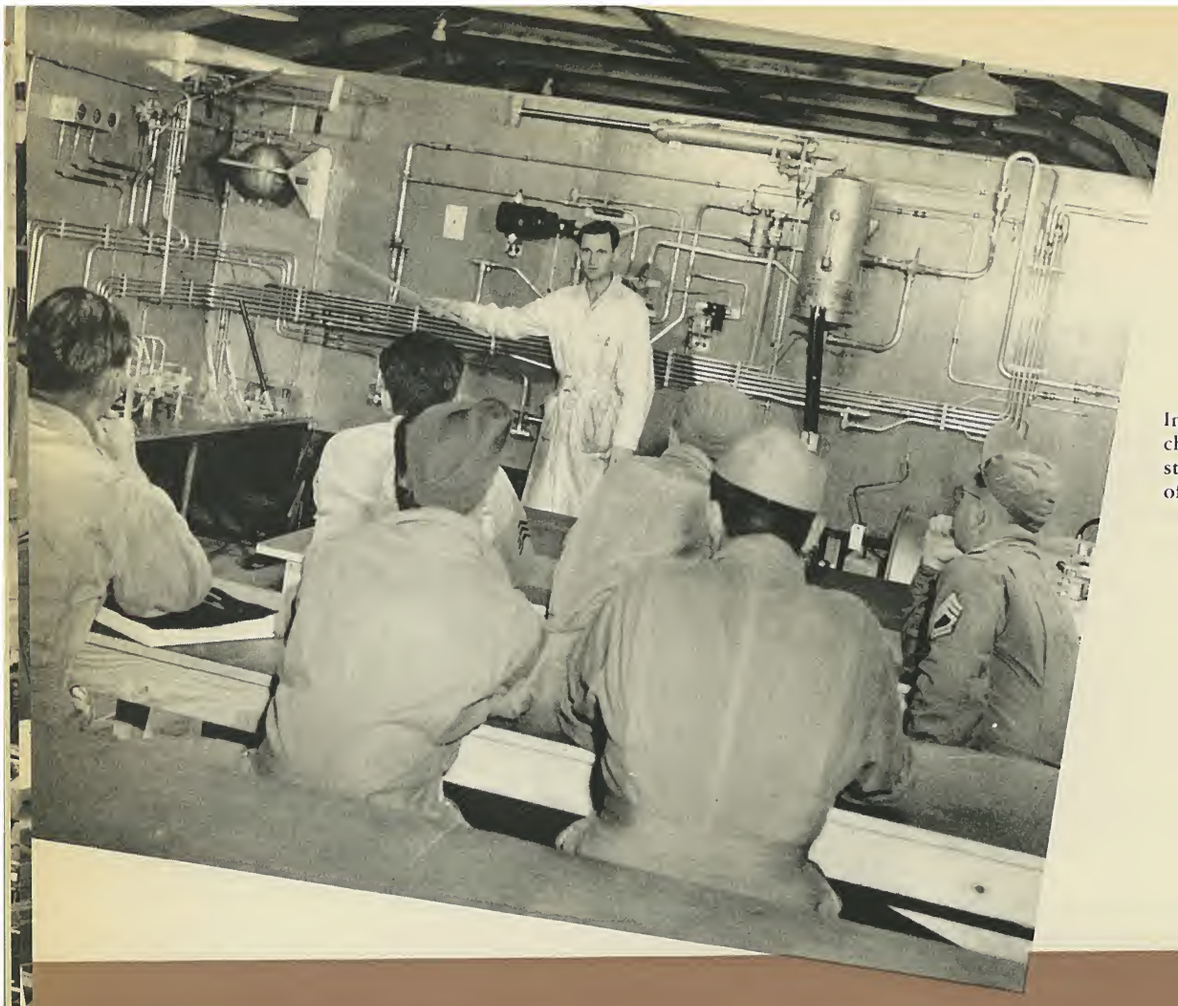
It travels on, accumulating tail surfaces and other parts; swings onto the second half of the line, where engines, outer wing panels, stabilizers and rudders are installed. By the time the outer wing sections have been added—some visitors have been heard to refer to these as "wing tips" — the new plane has the enormous wing spread of over a hundred feet. It does not take up this much breadth on the line, because it is placed there at an angle of 45°. By travelling in a diagonal position, considerable space is saved.

Most of the sections mated on the final assembly line are themselves extraordinarily complex assemblies, on which thousands of man-hours of work have been performed on sub-assembly lines.

The size of the problem encountered when these sections get together for a permanent mating can be realized when you learn that each Liberator bomber contains approximately 102,000 separate parts, not counting 85,000 nuts and bolts, and 400,000 rivets. In the final assembly all wires, tubes, hydraulic control pipes, must be accurately hitched on to corresponding mates in other sections of the ship, just as a brakeman connects steam pipes when railroad cars have been switched together.

So well organized is the whole process that Liberators flow off the line one after the other. Flexibility of the Consolidated Vultee methods, permitting adoption of needed modifications, can be seen from the fact that in the year of 1942 more than 200 changes in construction took place without interruption of the steady flow.





In this classroom the hydraulic and m
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stretched out along the walls; each in
of tubing can be dissected and studie

Training Doctors for Wounded Bombers

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Every time a Liberator bomber rolls off the assembly line, a scheduled number of spare parts go with it. To keep Liberators operating at top form, the Army Air Forces need skilled service men. Today, by the hundreds, they are being graduated by the AAF Technical Training Command to do the servicing. Such men, trained to work under all conditions all over the world, can — and must — take a Liberator apart and put it all together again. They learn how through their schooling at Camp Consair.

At Camp Consair meals are served on a 24-hour basis, for the school runs on a three shift schedule.

IN war, bombers get hurt — sometimes badly. They need care, overhauling, constant regular inspection and adjustment to keep them sound for combat, ready for battle.

That takes men, experts in mechanics, craftsmen skilled to do a maintenance job under every conceivable condition.

Camp Consair—and others like it—help provide them. Here men selected because they have shown unusual aptitude, in basic mechanics, camps throughout the country, are turned into specialists on Liberators. Where the planes go, they go — under the AAF plan of a man for every motor.

These men come from every walk of life. The ex-butcher, baker or candlestick maker learns to take Liberators apart, to put them together again, and even — in an emergency — to improvise repair parts.

Consolidated officials provided the site for Camp Consair on San Diego bay, next to the company's plants. They put up the buildings; prepared a comprehensive text book — 400 pages of fact, figures and "how to do-s"; set aside a number of Liberators for "classroom" use; created working "mock-ups" for close hand study and inspection. The instructors are all Consolidated Vultee experts, taken from production for the important job of making more experts.

Camp Consair, which opened May 17, 1942, operates under the direction of the Air Force Technical Training Command, with Captain Jack Mason Lyons in charge. He and T. P. Faulconer, director of the Educational Division at Consolidated Vultee in San Diego, head a staff of more than 150 civilians and enlisted men looking after the needs of almost a thousand students.

The boys live, sleep, eat in wooden barracks — fifteen in all, plus mess and study halls, laboratory buildings, and officers' quarters. They work and study intensively eight hours a day, in close-knit groups of from five to ten. They complete their course in four weeks, 120 graduating under the rotating system every week.

School "keeps" 24 hours a day. Several groups are trained simultaneously; the camp is run on three shifts, just like the aircraft plant next door.

Learning to master the workings of a Liberator is an involved job. There are hydraulic and electric systems, miles of wiring, a complicated control system, fuel and oil lines, oxygen systems, de-icers and anti-icers, a whole maze of instruments built as fine as watches.

When the boys are graduated from Camp Consair they are ready to go to far reaches of the world. Some will work sweating in the 130 degrees of Egypt's dry heat; others in the dripping wetness of tropical jungles; still others in the breath-freezing cold of Alaska or Newfoundland.

Wherever they go, the lives of many good men will depend on their ability and judgment and training. The students at Camp Consair know this, and they are a hard-working and serious group of young men.

Field work supplements class-room training at Camp Consair. Liberators are the laboratory.

LET'S GO!

"From Greenland's Icy Mountains to India's Coral Strand", sang the old hymn. The crews of Liberator transport ships, in the Ferry Command service, are regularly carrying America's vital war shipments just as far, in a matter of hours.

Liberator crew at San Diego, after a flight home from a freight-carrying trip to some Pacific goal.

Russell R. Rogers, who heads Consolidated's Flight and Service.

To India's Coral Strand

Loading a truck with oxygen cylinders and parachutes for delivery to a Liberator about to take off.

YOU can't know all about it until the war ends. Spare motors loaded in Detroit today, in Greenland tomorrow. Plane parts and blood plasma in Australia after leaving America perhaps 36 hours before.

Pilots over some routes, such as certain parts of Africa, carry with them letters from the President of the United States, offering a ransom if they are forced down and captured by one of the violent native tribes. Over many of these routes there are no radio beams; map navigation is almost impossible because of the sameness of the territory; navigation by the sun is difficult, because of obscuring dust clouds. But the planes go and come, almost with the regularity of clocks. A Ferry Command Pilot was recently complaining bitterly in Washington that his laundry was in India and he couldn't recover it until his return the following week.

Express cars of the air now shoot through space at speeds over 200 miles an hour. (Soon it will be even faster.) They point straight as a die to destinations, leap all barriers of continents and oceans.

AT Consolidated Vultee in San Diego is a huge room crowded at all hours with pilots who are among the best long range flyers in the world. Some are just back from faraway islands and continents; reporting and turning in equipment. Others, soon to leave, study the flight schedules posted on the wall blackboard, check weather reports, swap news, pour over maps. This is the company's Flight and Service Department, headed by Pilot Russell R. Rogers as General Manager. He and his executive assistant, Richard McMakin, have seen their responsibilities grow almost overnight into those of a flight organization reaching across a continent and an ocean.

Liberator Express planes, for instance, have for months maintained a regular schedule in a foreign service operated by Consolidated Vultee representatives for the Air Transport Command of the Army Air Forces. Other Liberators are in use on other transport routes that virtually span the earth. General George Catlett Marshall recently spoke of Americas' new routes through the air-ocean as follows:

"We are hooked up by air transport all over the world. It is difficult even for people in the War Department to see the picture as a whole. We are building major bases around the world. We have a tremendous installation in the Persian Gulf . . . bases along the shore of the Red Sea area . . . a double track across equatorial Africa . . . lookouts strung clear across the Himalayan passes."

Such thorough-going organization our new air routes helps explain how it possible for the President of the Un States to fly 6000 miles to meet the mier of Great Britain in Africa, as casu as Lincoln visited the Richmond fron horseback in the War between the St or how a vital military hospital in Ala when burned to the ground, was repl in just 36 hours with emergency facil brought in by air.

In actual fighting, air transport is b used to carry men and weapons to locat that otherwise they might never reac time to win a victory. In supplying fighters with material, and in evacua them when they are wounded, air trans is an arm reaching from almost every t in America into the depths of any d and jungle our fighting men penetrate

It is a new power for our Army, a

A new Liberator Express, just off the Consolidated Vultee assembly line at Fort Worth, is loaded with cargo for its maiden voyage.

Navigators must be expert. A slight miscalculation could lose the plane in trans-ocean crossings.

A war correspondent travelling on a Liberator uses a crate as a typewriter desk, writes en route.

Taking a radio compass bearing, as here, is not always possible in areas without radio beams.

comfort for our people. As one columnist explained it, "Parents of boys fighting in North Africa will be pleased to learn that Army bombers and transports can fly wounded Yanks to Palm Beach in 15 hours."

While he wrote, another Palm Beach hotel was being converted into an Army hospital.

The ATC links our Government with our allies. An American official can leave our coast in the morning and dine in London that evening. It links our men to their families. V-mail passes back and forth in days, instead of months.

NONE of these elaborate transport routes is much over a year old. In the beginning, the whole undertaking had to be an improvisation. In the evacuation of Java, for instance, cargo and people were packed in the fuselages of Liberators where bombs are ordinarily carried.

Recognizing that the need for air transport would be almost unlimited, the Army ordered Consolidated's Fort Worth plant to devote a whole assembly line to producing a modified Liberator designed exclusively for transport service. This was the origin of the Liberator Express. The work was done without shortening the scheduled production of Liberator bombers in any way.

Further, to fill a gap, the Army Air Force took over many large planes from America's established commercial airlines, and also put into transport service any other available planes that could be suitably converted.

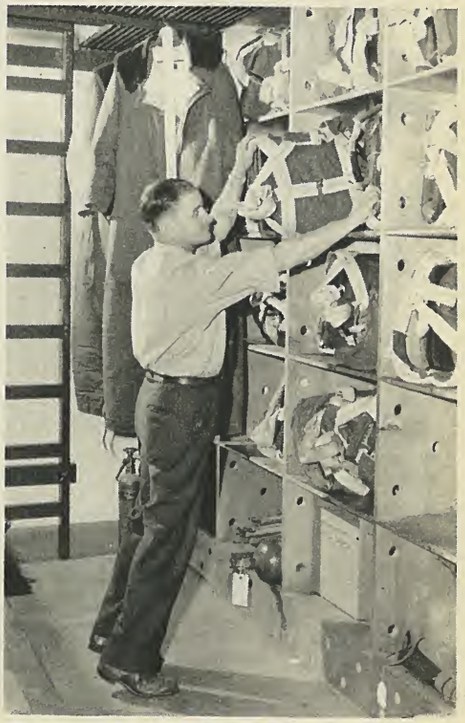
General Harold L. George of the Army Air Forces directs this transport operation, as head of the Air Transport Command. Military personnel and trained civilians work side by side. It was found most practical, in setting up the new routes, to put their operation in the hands of the commercial airlines and of organizations like Consolidated Vultee, in order to utilize their experience to the full. The Air Transport Command is in charge of integrating and directing the operations of the whole. Some of the newly established routes are manned by Air Force personnel, others are flown by civilian pilots under AAF supervision.

In addition to operating or supervising its regular transport routes, the Air Transport Command is responsible for delivering new planes at the front. Such planes as Liberator bombers are sent out carrying, in place of bombs, a maximum load of material or passengers. This work is in charge of the Ferry Command of the ATC. Its members speak of "ferrying" planes over. There are even some women in the Ferry Command — an experimental unit of about 50 members, called the Woman's Auxiliary Ferrying Squadron.

THE work being done by this world-wide air transport is literally changing the course of world history. The greatest troop carrying air armada yet assembled by the United Nations flew "many thousands" of fighting men from England to North Africa, for the surprise attack there; it was a non-stop trip of some 1400 miles, carried out simultaneously with the arrival of the sea-borne troops. Due to the pioneer work of the air transports to Alaska, this vital theatre of operations can be serviced today and communications kept open to every point. The servicing by airline of our Army and Navy units in Midway is another story yet to be told. Captain Rickenbacker recently revealed that Army and Navy transport groups now average 500 trans-Atlantic flights a week, "and more are being added all the time."

The Navy, like the Army, has found air transport an invaluable aid on all the fronts it guards. Consolidated Vultee makes for the Navy its own version of the Liberator, which the Navy calls the PB4Y-1, in addition to the Coronado flying boat, the PB2Y-3. Both of these models have been used by the Navy for transport purposes.

The work of our fighting forces necessarily gets the headlines. But when the war has ended, the routine and unheralded work of our Air Transport Command will be understood as one of the most extraordinary overnight developments of our age.



Parachutes in the Flight and Service department are stored in racks, high altitude suits nearby.

Flying Around the World in 6 Days

AFTER the war a trip like this is going to be quite practical for you and your family. (Aircraft experts say it will be fairly cheap, too, cost no more than the boat transportation of yesterday.)

You could start off from New York, touch at Washington and West Palm Beach; go on to Porto Rico; then go to Natal, Brazil; from there cross the Atlantic to Africa; look in on Accra, on the famed Gold Coast; cover other African points like Kano, Nigeria—Khartoum, in the Anglo-Egyptian Sudan—Cairo, p glot city of Egypt—Palestine and the H Land. From this point in the Near-Eas natural route back to America could through Bagdad, Mesopotamia; Kubys Moscow, and Tashkend, Russia; Urum Hang Chow, and Chengtu, China; t through Outer Mongolia and Siberia Fairbanks, Alaska; thence via Edmon Canada, and Minneapolis, Minnesota, t to Washington. Home again, you wo have covered some 27,000 miles.

This is the exact trip which Wendell Willkie made in just six days and six hours of flying time, without counting stopovers, using a Liberator transport ship called "The Gulliver" by its crew.

Today's Liberator now makes up to 300 miles an hour; was used by Churchill for his trip to Moscow and more recently to meet President Roosevelt at Casablanca; and by General Arnold for his record-breaking trip from Australia; is often preferred for vital transport assignments. But after the war you yourself will be able to make the trip even faster—Consolidated Vultee has far bigger airplanes already planned.

The Greeks Had a Word for It: Amazons

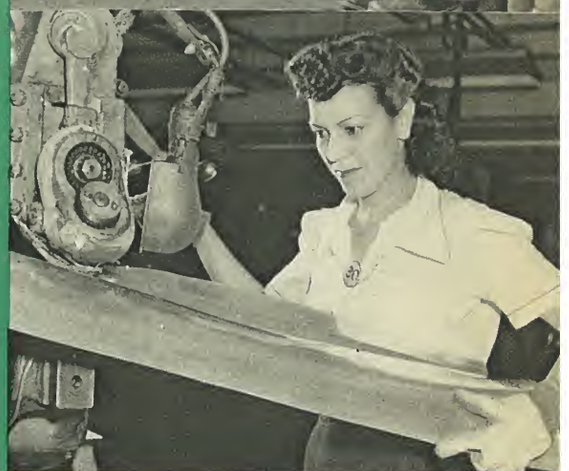
Harry Woodhead Suggests WICs for our own women warriors: Women's Industrial Corps

SAN DIEGO
PUBLIC LIBRA

Here are 23 of the 40 women who pioneered at the San Diego Division two years ago by going into aircraft production work. Today the women employed in Consolidated Vultee plants are numbered by the thousands, and all are doing work that men once did. Tom M. Girdler predicts that 50 percent of the employees will be women soon.

worker is using a portable electric drill, pre- for riveting. Notice gaps left between rivets dy installed; these are closed gradually.

Women have the patience for intricate work required in the Liberator's electric nerve system. Relay boards, switch panels, and fuse boxes are part of it, are added in the electrical bench division.



This Vultee Field worker has claimed a world's record in cutting through 4,800 feet of aluminum in an 8-hour shift, with the circular shears machine.

The "Cats" Hav
Nine Live

Catalina at Western Australia Base. *Official U. S. Navy*

The Catalina, one of the most versatile of the planes made by Consolidated Vultee Aircraft Corporation, is in the news almost constantly on our eastern and western fronts. It is being employed in two models — the PBY-5, which is a flying boat, and the PBY-5A, an amphibian plane with retractable landing gear that takes off either from land or water. Both our own Navy and our allies are using the Catalina as a patrol bomber. The Navy has just ordered $30,000,000 more of the amphibians.

by Edward Churchill

THE Catalina cruised steadily at 6,000 feet. It passed from the Pacific across the shoreline of an island. From its blister a figure, dark against a blue sky, shot downward. A parachute mushroomed, the man floated slowly toward earth. The Catalina droned onward into oblivion.

Let Corporal Keen, RAAF flight engineer, tell his story.

"The plane contained a crew of eight, and we were on patrol," he says. "We spotted a Jap cruiser. We radioed our position so the other boys could come out and knock her off. Then we began circling, watching our prey."

Keen doesn't know exactly what happened, except that "all hell broke loose." He has a faint recollection of six or seven Zeros attacking. He was knocked cold by concussion.

"When I came around," he relates, "I called the pilot on the inter-com. No answer. I left my station, staggered forward. I passed gunners, radio man, navigator. They were dead. One man was horribly mangled. Must have been hit with everything, including a cannon shell. In the pilots' cockpit I found both men dead. Seven gone! Only I lived, and I d know how to fly the plane. It was o even keel. The pilot, before dying, turned on the robot pilot.

"I waited for land. Then I bailed. tives picked me up about a week later.

Corporal Keen is now back with squadron, flying again. No trace of sturdy Catalina, final resting place seven heroes, has been found.

"How that plane took it!" Keen "I think the Zeros gave it all the am nition they had, ran short of gas and to turn back, probably thinking that men were flying some strange, indest ible craft."

This is only one of the stories co with dramatic simplicity, from the air of the Pacific. There is the saga of PBY-5 fondly titled "Grand Dad" and in service. It was bombed and shot the Japs at Manila. It was flown to and, mortally wounded, was aband there. A Dutchman with mechanical and the need of flight, patched it up flew it to Australia. It was completely hauled, is still one of the most capabl the line.

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Official U. S. Navy Photo

Beaching crew uses line to pull Catalina into landing position.

SQUADRON Leader G.U. "Scotty" Allan. Spert, bird-like Scot, native of Lanarkshire, told about "Grand Dad" when he recently came from "down under" for a quick inspection trip at Consolidated Vultee's great plant in San Diego. "Scotty" is now mothering a brood of seaplanes, many of them famed Catalinas, and is training personnel. Where? How many? Exact duties? "Scotty" is bound not to tell.

"There was a night patrol," he relates, "and a 'Cat' bumped into some Zeros who poured shells into the port engine, cutting the oil lines. The motor quit. With one left, the pilot staggered 420 miles over the Pacific, landed in open sea. He found he was in enemy territory. He and his crew dumped a lot of oil from the starboard engine into the port so that it would be lubricated well enough for take-off. He had to have two engines to get off that rough water.

"He got off all right. Then, still in the dark, he flew 400 miles back to his base. Yes, the planes can take it. But the pilots need planes, and they'll do anything rather than lose one. They'll go to any lengths."

PLANES are always getting shot up by machine gun fire, anti-aircraft and anything else the Japs can hurl their way. "Scotty" tells about rubber plugs, wooden plugs and metal plates lined with rubber, which go up on every flight. You see, after a Catalina hull has been shot full of holes, it sinks when you land – unless you get desperate and plug the holes.

"The 'stoppers' are carried in a kit box about two feet long, one foot wide and one foot deep," Allan explains. "After you've bumped into the Nips, you start to work. If the hole is small, made by a machine gun bullet, and is jagged, you ream it out with the round end of a thing that looks like a tomahawk. Then you push in a rubber plug.

"It might be a cannon hole, about an inch and a half in diameter. In this case you'd use a wooden screw. We had plain wooden plugs at first, but now we have 'em with flanges. The water swells the wood and holds it tight in the hole.

"For the bigger stuff we use an inside plate with rubber around the edges, a smaller outside plate which we force through the tear. We tighten a dowel, pulling the two plates together. If there's a stringer in the way, we hack it out with the knife end of the tomahawk."

ALL this has to be done between the time the battle is over and the plane is landed. Sometimes, after being badly shot up, the boys are pretty busy. The whole crew pitches in.

There are times when the Catalinas have to come down on heavy seas, landing with a terrific bounce and wrench. Now and then a "back" gets twisted, which means that the area of the fuselage between the tail and the wing has buckled.

"The boys bring 'em in shored up with timber," Scotty says.

He'd like to tell more about the heroic exploits of the men who work with him. He says he'll do it after the war is over.

"It's teamwork, not starring, that counts with the RAAF," he explains. "In fact, if a man gets his name in the paper he has to buy drinks for all the officers in the mess. Sometimes, with fifty or more, this runs right high."

There's a Scotch twinkle in his eyes when he tells that.

He learned to fly in 1917, flew in Egypt, left the service in 1918. He has flown commercial from 1920 to 1939, had 13,917 hours when he again enlisted.

"This war is tougher than the last," he says. "The Japs are shrewd, skilled pilots. There's some talk about them not being as good as they were at first. But we see no sign of it."

Australia's need?

"Planes, planes and more planes – from pursuits to flying boats, from cargo planes to bombers."

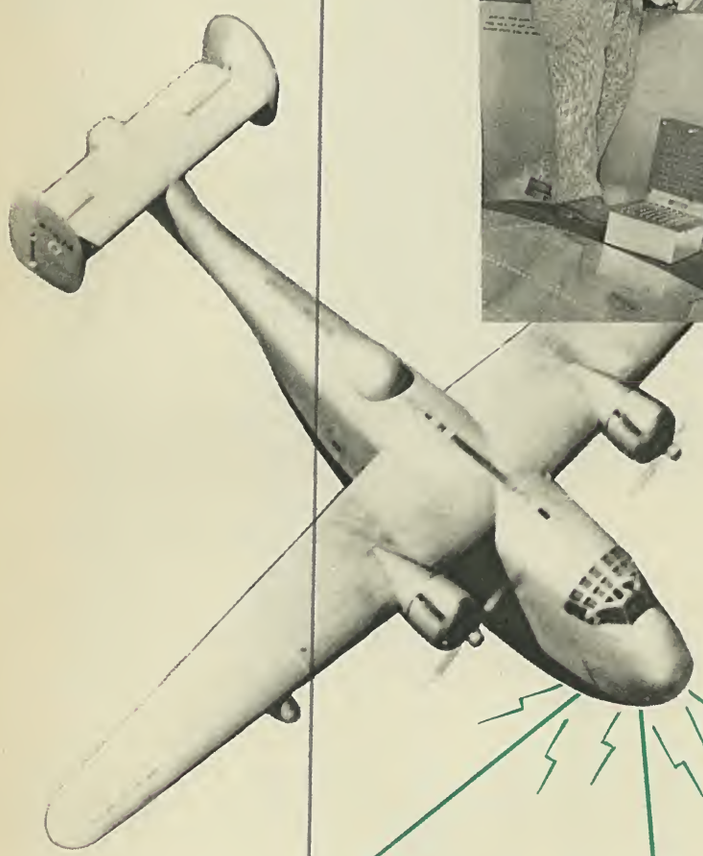
Passed by British censors, this photograph shows a Catalina being readied for Indian Ocean patrol work. *Wide World Photo*

An R.A.F. gunner keeping "gun watch" in the blister of a Catalina, on duty in Atlantic sea-lane patrol. *British Air Ministry*

In Alaska a Navy ground crew up to armpits in ice-choked water guide a Catalina to its base ashore. *Press Association, Inc.*

New Flight Recorder Never Lies

BELOW: Consolidated Vultee P4Y Flying Boat, scheduled for early production at New Orleans for the Navy. RIGHT: Installing the aerial unit of the Flight Recorder in a plane ready for its test flight.



WHEN planes moved at only 100 an hour, a test pilot taking a new into the air could at all times be pretty of what was happening. The report he when he reached the ground, was an rate picture of the plane's perform

But in today's powerful planes ar bodied forces too great for the five s of the human body to measure and re The picture of the strains and flu characteristics, performance, and rea in the new aircraft is too complex fo pilot's eyes, hands, ears and brain to and transmit.

The automatic flight recorder, just fected in the engineering laborator Vultee Field, now eliminates these ards of human perception and judg It is a radio operated mechanism w placed in an airplane, instantane transmits to laboratory crews on the g a complete and accurate report on every part of the plane is performing the stresses of flight.

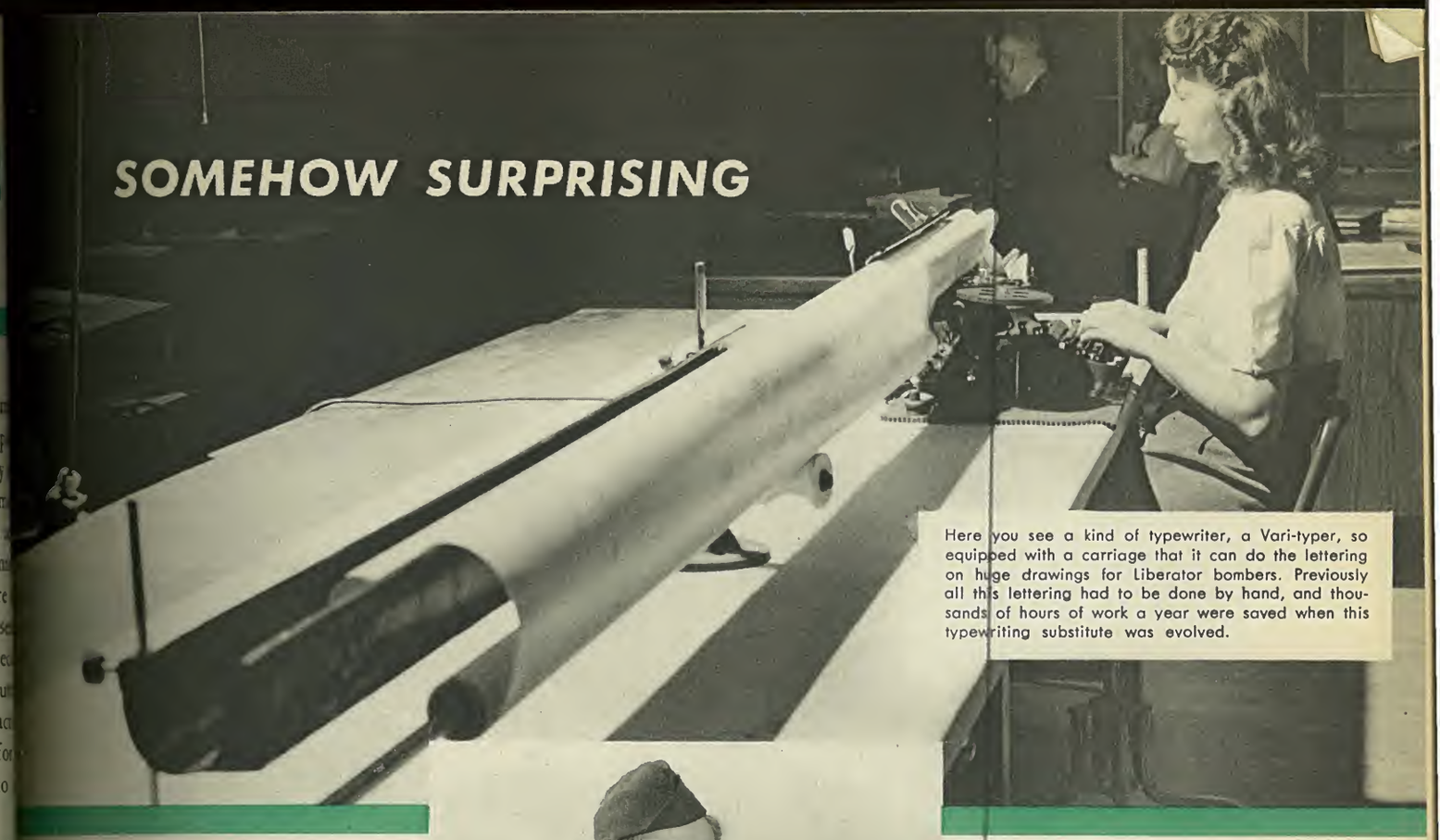
With this device in operation, the nicians below actually know more the airplane's condition in test flight does the pilot at the controls.

Flashed to earth by radio, the plane's reactions are picked up by the ground unit, recorded on tape, sound film, and wax discs.

The new device permits the pilot to be merely a chauffeur for the plane, relieves him of responsibility for reporting the plane's reactions. Shown here, second from right, is Harvey Giffen, inventor of the device, with assistants at Vultee Field.

Sound records, run through this analyzer, appear as graphic cha tions reported by each instrument

SOMEHOW SURPRISING



Here you see a kind of typewriter, a Vari-typer, so equipped with a carriage that it can do the lettering on huge drawings for Liberator bombers. Previously all this lettering had to be done by hand, and thousands of hours of work a year were saved when this typewriting substitute was evolved.

...ast forty workers on the Liberator production ... are all preachers, taking courses at a Fort Worth ...ary and spending part of their spare time build... ...ger power to defeat our enemies. Left to right ... are John Maddox, B. Lester Huff, William Ussery, ... McMurray.

Mrs. Elzada Brinkerhoff, shown in her new uniform at Vultee Field, has a lot of relatives in the services, including a husband who was taken prisoner by the Japs at Guam. When a Japanese shortwave broadcast came over the ether, purporting to carry an interview where the imprisoned Brinkerhoff said he was "having a fine time, with Geisha girls for entertainment," Mrs. Brinkerhoff got really mad at our enemies and went into uniform herself.

By telephone to Hawaii, Evelyn Daniels in Fort Worth got married by proxy to George M. Shoffner, aircraft engineer now stationed at Hawaii's Hickham Field. It's all legal, but a church wedding is to follow later in Honolulu. Meanwhile Evelyn is helping Consolidated Vultee build Liberator Expresses.

...ings that look like pies coming out of a baker's ... are actually parts for Liberators, riding on a con... ...k that takes them through a paint sprayer. ...ation that has been effected in Consoli... ...Vultee production is dramatized here by the ... number of people at work in a vast room where ...ands of parts are processed daily.

In one part of the Consolidated Vultee organization are folks who get paid for literally "lying down on their jobs." These are the workers in the Loft Department, trained artists and draftsmen, who lie on their stomachs, propel themselves on tiny scooters, while sketching designs on huge pieces of metal that make body sections for planes.

Not quite ice cream wagons, but almost, these carts carry iced rivets to the Liberator production line. Cold rivets contract. After installation they warm up and expand, making a tighter fit with greater holding power. These carts rush them, packed in dry ice, from the storage refrigerators to the rivet guns.

I was there

Our press services and radio networks are doing a job in this global war that has never been equalled in war reporting before. Correspondents take all the risks of soldiers and airmen, without being armed themselves. A number have been killed, wounded, or taken prisoner.

Here are some excerpts from recent news dispatches telling just what a man feels and sees when he rides a fighting plane aloft.

HELL-HOLE IN THE PACIFIC

EDDIE RICKENBACKER SPEAKING:

In New Guinea I found our Air Force boys accomplishing the impossible — always doing too much with too little. Under abnormal conditions they were bringing down four and five planes for every fighter we lost. The heavy bomber Flying Fortresses and B-24 Liberators were bringing down from eight to ten enemy planes for every one we lost.

The boys on the ground in Buna and Gona — one of the hell-holes of the Pacific — were fighting in the jungle with its filth, vermin and mud, to say nothing of the Japs, diarrhea and malaria.

Our Air Force boys were transporting reenforcements, supplies, ammunition, cannon, rations and evacuating the wounded. It was the only form of transportation available.

Official U. S. Navy Photo
Catalina based in Western Australia getting overhaul.

Press Association
Liberator crew in "Mae West" belts for Wake Island raid.

Here is a thought for the engineering fraternity in all branches of production of war supplies and material.

With this war certain to last two years or possibly more, and our transport planes becoming larger and larger, everything that is needed for the troops — artillery, automobiles, tractors, bull-dozers — should be designed with one thought in mind: of making them simple to disassemble and reassemble so they may be transported by air. It is an absolute necessity.

Returning to Australia and then through the Fijis to Guadalcanal, I arrived in this hell-hole as the rainy season was starting.

Henderson Field runway is a metal strip that has been bombed and shelled for months, and it is also the airplane graveyard of the Pacific, not only for enemy planes but our own as well.

Dugouts were filled with mud and water. Men were working in jumpers without shoes or socks. Marines and soldiers were in the foxholes with billions of mosquitoes. Malaria prevalent, as was diarrhea.

Here you will find a Catholic priest, a Pro tant preacher, or a Jewish rabbi, all preach the simple faith to Catholics, Protestants Jews alike.

Oh, men and women of America, if could only understand what our boys — boys and mine — are doing in these hell-h throughout the Pacific and the burning san Africa, that your way of life may be prese and the character that has made this n great may be carried on, you would not w about eight hours a day overtime, or do time for Saturdays and holidays.

— *Captain Eddie Rickenbacker, q by the United Press.*

Wide Wor
Aussies groom veteran Liberator in Mediterranea

ARMADA IN THE MEDITERRAN

GRANT PARR SPEAKING:

When we hit Navarino Bay we were a miles above our target, breathing oxyg keep from suffocating in the thin air, and ing heavy wool and leather flying suits to from freezing in the subzero temperatur

The target spread out below us like th ored relief maps that had been handed ou eral hours earlier in the briefing room. were our two transports, moored almo gether at the east side of the harbor. We coming in to bomb them so I went up pilot's cabin to watch our nine-ship form release its bombs. We already were flyi our bomb run.

Just ahead and below us was anothe erator with "Alice the Goon" lettered nose. On our left the third ship of our was recognizable by some fingers pain the nose in an emphatic, if vulgar, gestu our own bomber was the picture of a tra apparently once ran from Natchez to and from Memphis to St. Joe.

I crouched in a niche just behind th ward cabin, hanging to two handles an ing out over the open bomb bay. It was cold, but I was too excited to notice it.

With a slight jolt our bombs fell away ingly far wide of their mark. Then mor and wind drift whipped them in tow transports like a fast curve breaking o edge of the plate.

Bombs from "Alice the Goon" burst the left. The blast bumped our plane, there. Bombardier Gardiner estimated

(*continued on p*

On the Fighting Fronts

British Air Ministry Photo

…Churchill in the Middle East, after landing …Liberator bomber, shown in the background.

British Air Ministry Photo

R.A.F. beam gunners, in position on a Liberator in British service over the Middle East.

British Air Ministry Photo

R.A.F. Liberator crew in Mediterranean operations release a flare through the flare chute.

Press Association, Inc.

Operational flight in North Africa: Liberator formation seen from the nose of the bombardier's compartment, winging to the target.

Back safely at base after meeting the enemy: Liberator scarred by shell fire.
Press Association, Inc.

British Air Ministry Photo

R.A.F. crew bringing up bombs to Liberator in England.

(*continued from page 30*)

own bombs, which fell in a semicircle around the ships, were as close as seventy-five feet, near enough to bash in the sides.

The men in the third element, which followed us in, saw smoke coming from one vessel and observed our near misses.

In a surprisingly short time the job was over. The next thing was to get home.

We were circling over the rocky mountains of Greece, waiting for the last formation to catch up, when we were attacked by fighter planes.

There were three of them, two Messerschmitt-109's and a Macchi-202.

A Messerschmitt attacked the Witch, the rear ship in the formation, and sent his bullets into the tail and wings of the big Liberator. One bullet went into the gas tank. An explosive shell blew up inside a wing. A slug went through the rear turret. One bullet ripped through three duraluminum braces. Another pierced two braces and went through a tubular steel gun mount.

All this bothered neither the Witch nor her crew. The pilot, Lieutenant Glade Jorgensen of Utah, phoned back to ask if any one had been hurt. "Yes," replied Gunner Frost, "but we got him."

He was right. The Messerschmitt had taken more than it gave. All the Witch's gunners kept firing, despite their wounds, and the gunners of the two other ships in the element were pumping lead into the doomed German. He bailed out of his diving plane but his parachute did not open.

The Macchi pilot was more careful. He slid down from above, raking the Witch as he skidded by. When he ended the manoeuvre he was almost in the middle, and slightly below, our nine-ship armada. He never had a chance. The guns of my plane opened up. The leading element opened up, too. Gunners from the Witch's group were still firing. The Axis fighter spun down, out of control, and the pilot parachuted into the sea.

The third enemy fighter peeled off and that was the last we saw of Axis planes.

Now it was only a flying job of getting back home through the clouds and darkness over several hundred miles of water.

As we flew over Greece I wondered as I saw little white towns nestling in the hills, what misery their tiny roofs concealed. Could the Greeks see the white star on the blue field that marked our wing? Did it give them hope that help was on the way?

—Grant Parr in a wireless dispatch to the N. Y. Times.

OUT FROM ENGLAND

EDWARD MURROW SPEAKING:

The other day some one said "there's plenty of action in the Bay of Biscay these days," so I decided to fly down and see.

There were nine of us; seven boys wearing the RAF blue, a big four-motored Liberator Bomber from San Diego, and myself. It was a routine patrol coastal command, one of the dozens of planes that fan out from this island every day, sweeping thousands of miles of ocean, looking for U-boats, covering convoys, and checking the weather.

The people who make these planes ought to be proud of their handiwork. Yesterday a Liberator took on five German fighters over the Bay, shot down two of them, and then came home again.

In the early morning light our Liberator stood on its own parking place, a kind of concrete frying pan with the handle attached to the main runway. As I straightened up inside the plane with my feet still on the concrete, my head hit something hard. The flight engineer standing beside me said "Careful—that's a depth charge." There were several of them on each side of a narrow catwalk, hanging there like milk cans in the old barn. We scrambled up to the flight deck and the bomb doors rolled to beneath us, just like one of those roller top desks, and the little Cockney wireless operator jerked a thumb in the direction of a parachute and a Mae West life jacket and he said "These are your ones—just in case." Someone else handed me a little packet of concentrated food with the remark that it should be kept in the pocket—just in case.

The red-headed flying officer at the controls checked his instruments, eased the throttles forward and the Liberator began to roll. I looked aft and saw the flight engineer leaning against the depth charges—combing his hair. When I turned my head we were air-borne, the green and brown fields of England slipping away beneath us.

Soon we were over a cold, gray sea, looking like a huge gray blanket covered with chips of marble. George, the automatic pilot, was put to work and we flew a steady course. Far ahead there was the smoke of a coastal convoy. The sergeant pilot reached up and pulled the trigger of a big pistol fixed in the roof. There was a hollow "plop" and a colored ball of light burst in the sky above us. The destroyer escorting the convoy winked an answering light signal, and we soon left the convoy, each ship towing its barrage balloon behind.

I. N. S. Photo

Navigator on Coronado, naval "battleship of the air."

There was a glimpse of Land's End a
gunner in the upper turret turned on the p
and swung around in a circle behind hi
machine guns. The turret was made in b
more. Communications with the tail turre
the side gunners were tested while the en
from Hartford pulled the Liberator, wi
belly full of depth charges, down toward
center of the Bay of Biscay. I saw a subm
off to the port, needling along on the su
The flight engineer leaned over and rem
"That's no way to travel these days." She
British submarine. I crawled back betwee
cans of dynamite for a talk with the tail gu
But he was too cold to talk. The after part
aircraft seemed filled with machine gun a
nition, flares, smoke floats and life rafts. I
back to the flight deck for lunch—sandw
a boiled egg and an orange, plus plenty
coffee. It was the first real orange I'd see
many months. But the men who fly that
can have mine any time. They earn them.

The wireless operator scribbled a me
handed it up to the pilot, and clamped th
phones on his head again. I wondered

British Air Ministry

Catalina at Gibraltar, ready for R.A.F. U-Boat

many people were flying through the air
very moment, ready to drop things on
people. This flight is very comfortable
pared with these long night hauls to Italy
bombing of Genoa and Turin must be m
good news in Abyssinia. I hope the native
there, who haven't forgotten the Italian b
ing of helpless villages, get to hear of
four-thousand-pound bombs cascading do
Italian cities.

I said to the pilot "Let's go on to Gibra
He shook his head and told me he was
there a couple of weeks ago—"very nice i
too, plenty of sunshine." But he'd really li
take his Liberator down to North Africa,
there must be good hunting off that coast

Finally we turned for home, heading
toward the island U-boats are trying to
and I began to think about what we'll do
all these thousands of bombers when the
over. Some day, if that Liberator lives, it m
carrying food and clothing and medici
Warsaw or Belgrade or Rotterdam. Hug
of concentrated food may replace these
charges hanging in the bomb bay. People
continent may learn to listen to the dro
those four motors with hope and confide
stead of fear.

*—Edward Murrow, speaking from L
over the Columbia Broadcasting Sy*

No Spot on Earth is more than 60 Hours from Your Local Airport

ALONG with all that's being said and written about the kind of world we'll be living in after the war, here's one fact you cannot ignore: "No spot on earth, however distant, is more than 60 hours' flying time from your local airport!" That's how small the world is today, because of the plane.

If you doubt it, ask the pilots and crews who are flying today's big long-range planes, ferrying military personnel and supplies to our far-flung battle fronts. They'll tell you that the Atlantic is only 400 minutes wide—that Australia and San Francisco are a mere 35 hours' flying time apart—that you can hop from the U.S., touch Brazil's hump, and come down in Africa, all in 27 hours' flying time.

Or look at one of the new "aviation geography" maps, like those our children are studying in school. These maps make obsolete the maps we have always known. They show us the world as it really is. In this world, because of the plane, Main Street runs from your home town to London, Moscow, and Chungking. Nations and people we once thought remote are now merely hours and minutes away.

MERCATOR PROJECTION

If a Liberator bomber, *built in San Diego, were crated and shipped the 9240 miles to Algiers by sea, it would arrive about a month later.*

POLAR AZIMUTHAL EQUIDISTANT PROJECTION

A Liberator bomber *is capable of flying the 6210-mile airline route from San Diego to Algiers in about 31 hours' flying time.*

From El Paso, Texas, *to San Antonio, Texas, is 617 miles—an 18-hour trip by train.*

The airline route *from New York to London is 3460 miles—a 17-hour flight.*

AIR-AGE TIME TABLE

FROM	TO	AIRLINE MILES	HOURS
New York	Berlin	3960	20
Chicago	Singapore	9365	47
New York	Capetown	7801	39
San Francisco	Wellington	6759	34
Washington	Moscow	4883	24
London	Rome	887	4½
New York	London	3460	17
London	Berlin	574	3

Today, of course, the global skyways are reserved for war. But after the war, when freedom of the air returns, trade and travel by plane will become as much a part of everyday life as the use of cars, trucks, busses, railroads, and ocean liners. It is no dream of the future to count on global transportation in giant planes which fly almost with the speed of sound itself. Even today, such planes are being designed.

The Air Age has come, sooner than we thought. Already we have had to learn that wars must be won with the *aid* of the new Air-Age geography—not in spite of it. And we are beginning to see that the peace we win must be built on a clear understanding of this new global geography and how it can work *for* us.

The tens of thousands of men and women who make up the U.S. aircraft industry believe that America must be supreme in the air—to win the war today, to win the peace tomorrow.

They know that air power alone will not win the war. But they find it difficult to imagine a nation which possesses the *finest* planes, and the *most* planes, going down to defeat.

CONSOLIDATED VULTEE AIRCRAFT CORPORATION

San Diego, Cal. • Vultee Field, Cal.
Fort Worth, Texas • New Orleans, La.
Nashville, Tenn. • Wayne, Mich.
Allentown, Pa. • Tucson, Ariz.
Elizabeth City, N. C. • Louisville, Ky.
Miami, Fla.

Member, Aircraft War Production Council

Excerpt from an advertisement of the Consolidated Vultee Aircraft Corporation

LIBERATOR OVER GRAND CANYON

Plane Talk

JUNE · 1943

LIBERATOR EXPRESS IN THE FAR NORTH

Airpower and I. M. Laddon · · · · *The story behind the Liberator*

Riders of the Apocalypse · · · · · *How a Combat Crew is made*

Plane Talk

PUBLISHED BY CONSOLIDATED VULTEE AIRCRAFT CORPORATION

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By IVAN DMITRI

Pilot and mechanic of a Liberator express plane in the far north. The pilot, at right, is warming himself with one of the heater units used more generally for warming up motors and compartments in planes. For Dmitri's story on developments near the top of our world, read "Trip to Polaris," Page 22.

Back Cover

Crew 247 with its Liberator bomber at Davis-Monthan Air Base. "Riders of the Apocalypse" tells the story of this crew, and its training for the tasks that lie ahead. See Page 10.

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I. M. Laddon and T. M. Girdler eating soldiers' fare at Camp Consair, which adjoins the San Diego plants.

AIRPOWER
AND I. M. LADDON

The heavy bomber—four-engined to give it speed, power, and range — is the backbone of the airforce, and thus of national air power. In America just two organizations have designed and created such great planes. One is Boeing, with its Flying Fortress. The other is Consolidated Vultee, with its Liberator bombers and express planes. Back of the unique Liberator engineering stands I. M. Laddon, who began his work with Consolidated in 1927. Here is something about developments in that work you'll want to know.

CONSOLIDATED Aircraft — today Consolidated Vultee — was organized in 1923, but in one sense really took wing in 1927, when I. M. Laddon was brought in to design planes that might interest the Navy and Army.

The year was epochal for flying in more ways than one. For it was the time of Lindbergh's flight to Paris, and the public was just getting a first vision of what the airplane would some day mean.

That Consolidated's subsequent work has marched in step with America's rise to the position of a first-class airpower is no mere coincidence. The thinking of I. M. Laddon has contributed measurably to that rise. If few outside the technical field even know his name, this itself is a tribute to a creative man whom matter-of fact Tom Girdler has called a genius.

To say that Laddon has pioneered in the design of big ships describes his work

only in part. More important, as is said by men who know, he and his corps of engineers have never produced a bad or freakish plane. More interesting still, every plane they have created has incorporated ideas capable of further development, so that a still greater design has ultimately evolved from it. Every model has had dynamic qualities of further growth. To the aerodynamicist, this is one of the most significant aspects of Laddon's work.

Laddon himself is characteristically the first to disclaim unique personal credit. As executive vice president of Consolidated Vultee, he believes in organization teamwork of the same kind that exists in the crew of a Liberator bomber. Time and again, for instance, he will explain "Oh, we got that job done because of Chuck." He refers to C. T. Leigh, who joined the organization a year before Laddon and is now vice president. Be that as it may, Laddon is the heart of Consolidated Vultee engineering, by agreement of all who know.

Laddon's early work at Consolidated was in the flying boat field. To the layman the story of old plane models often seems stupid history. To the airman, those models are records of progressive thinking, as revealing as a book.

In the year after Laddon started his Consolidated work he offered the Admi to the Navy. With a wing span of 1 feet, it was the largest flying boat produc in America up to that time. A modificati of the design became the Commodo Fourteen Commodore flying boats, ca ing 20 to 30 passengers, were put i operation in the next two years in t South American service. They served wh was then the world's longest airline, r ning 9,000 miles through 15 countries a line that later was incorporated by P American into its South-American e coast route.

Study in Progress: *Above:* a historic picture showing the christening of the first Commodore, named "Buenos Aires", by Mrs. Hoover in 1929. *Below:* a Coronado christened in a ceremony attended by eleven Latin-American naval chiefs.

NOWADAYS when Liberators take off r ularly, so and so minutes apart, on d schedules across both oceans, and regu ly make new records (the latest was minutes, landfall to landfall, over the A lantic) the Commodore service of 19 seems kindergarten stuff. But then it unprecedented. And some of those Commodores are seeing service still.

The Navy had not previously been terested in any real quantity orders. when Laddon followed the Commodore developing the P2Y design, which wo Navy competition, a Navy order for planes promptly resulted. It was a fabul government order in those days. Th planes, too, had a 100-foot wing sp and a length of 62 feet. The Navy m a record with them by flying six in a n stop hop from San Francisco to Honol

That was in 1934. The next year C solidated moved from Buffalo to San Die Laddon's designs were largely the reas They were fast making the company's w in flying boats outstanding, and a har which would be free of ice the year aro was vital to research and experimentati

Further recognition from the Navy most immediately followed the move. June of 1935 the Navy gave Consolida an order for 60 PBYs.

This was the start of the PBY or C lina history. The PBY is a two-engine trol plane, which at that time Laddon h just perfected. An initial Navy order 60 was regarded as extraordinary. Th are still so uniquely serviceable, eight ye later, that the Navy ordered $30,000,0 more of them in the spring of 1943.

From the beginning, the Catalina crea

Fifteen Years' Difference: *Left:* Wings of the Model PT-3A being tested in 1928 with loadings of small sandbags. *Right:* Wings of the Liberator loaded by Consolidated Vultee workers, with plenty of safety factor to spare.

records. A flock of 88 flew non-stop from San Diego to Hawaii, in groups. Sir Hubert Wilkins used one to cover 19,000 miles in the Arctic, seeking the lost Russian trans-polar flyers. Richard Archbald flew one around the world using as pilot Russell R. Rogers, who now heads the Consolidated Vultee Flight and Service Department.

A still larger flying boat followed in 1937, the XPB2Y-1. This, with four engines, was the ancestor of today's Coronado (PB2Y). The Navy uses the Coronado both as a patrol bomber and a transport, in a transport service that was expanded this spring from three to ten squadrons. The Coronado, weighing 33 tons loaded, is the Navy's largest ship in volume production, weighs five tons more than the loaded Liberator.

Then, in 1938, followed Model 31, today designated by the Navy as the P4Y, which is just now going into production for the Navy at New Orleans. In many ways the P4Y was the forerunner of the Liberator. Even the layman, comparing photographs of the two, can note resemblances.

THE story of the Liberator is still being written. In at least one sense it is crucial. For the American airpower which Liberators are helping to build is already, in some way, affecting the life of every citizen.

By 1939, Consolidated's reputation in the design of long range flying boats for the Navy had been solidly established. In January of that year the Army Air Force made it clear that it, too, would like a plane from Consolidated drafting boards. It wanted nothing less than a new four-engined bomber.

In 1939, the Army Air Force had only one heavy bomber — the Flying Fortress, made by Boeing. First flown in 1935, the Fortress was a relatively old plane by 1939, as things are measured in aircraft progress. True, it had been steadily changed and improved, has since been further improved, and is a superb weapon, as has now been demonstrated. At that time it represented, in essence, the climax in a long trend. Advance in the arts of aerodynamics and design gave every indication that a new four-engined bomber could surpass its speed, range and load carrying ability. A designer starting from scratch to create a new heavy bomber that incorporated such basic advances might have a great advantage.

That was the beginning of the Liberator. With its tri-cycle landing gear, its narrower fuselage, its resultant speed and lifting power, it was a wholly new departure in land-based bombers for America. Both the Fortress and the Liberator are magnificent ships. And their performance in many ways seems similar to laymen who rely on performance figures for judgment. One basic difference, which is not registered in performance figures, is this: the one is a job of evolution; the other is a new concept suggesting many future avenues for further dynamic development.

The Army, which in January of 1939 naturally knew much more about the tottering state of peace than most civilians, wanted Liberators at the earliest possible moment after it had assayed Laddon's design. Laddon promised the Army Air Forces to fly the first Liberator before the year's end.

Laddon kept his promise with one day to spare. The experimental plane made its first flight December 30, 1939. The Army's first order had been for eight; this was raised to 46 before the test flight was made.

AT that particular time in domestic history, the Army had doubtless gone as far as it could. Authority to order the thousands it would be needing so desperately before another year ended had to wait upon Congressional appropriations which came after the fall of France.

Thereafter there was only one question. How could Liberator production be multiplied within a period of months, even weeks?

The Army Air Force had been watching an interesting development by Vultee Aircraft, at its plant only a few hours up the coast from San Diego in a Los Angeles suburb. Vultee had been acquired by The Aviation Corporation, headed by Victor Emanuel, and had been given the benefit of a new kind of production management.

Vultee made basic trainers—a first essential for expanding America's airpower, since pilots would be a first requirement. Harry Woodhead went to Vultee as chairman of the board. With C. W. Perelle, today a vice president, and some other able assistants, he installed new production principles — new, that is, for the aircraft industry. Vultee could soon boast of more machinery per square foot than any other air-frame manufacturer of the day. Production leaped, and the Army started getting deliveries of Vultee trainers by the hundreds instead of the dozens.

Vultee bought working control of Consolidated late in 1941. While the actual merger of the two companies waited until the spring of 1943, they were linked closely in management within a month after Pearl Harbor. Tom Girdler secured the permission of Republic Steel to take over the Chairmanship of Vultee and Consolidated; Laddon was made Executive Vice President and General Manager; and

C. T. Leigh is Laddon's close collaborator.

Harry Woodhead moved down to San Diego to take the Presidency of Consolidated. Mechanization of the Liberator production line, already under way, was given new impetus.

MECHANIZING the Vultee production line for trainers had been a slight task compared to putting great Liberator bombers into mechanized assembly. Many had said the Liberator job could never be done. But it was. The output at San Diego was vastly increased; man-hours per plane were steadily cut; a second great plant at Fort Worth was brought into production; Liberators began showing up on fronts from Alaska to Africa.

Concerning Laddon, Tom Girdler has said:

"Rich though Consolidated Vultee is in talent and especially in engineering talent, Laddon is the genius.

"Laddon's is the fundamental creative force which the organization is expressing. He is an engineer who became a great designer. Each kind of business has to have its emphasis on some special talent. In aircraft manufacturing the emphasis is unmistakably on engineering and design. Laddon knows the airplane business in all its ramifications. Airplane creations of his have become crucial instruments of civilization."

The Liberator was, of course, designed to do the job of a bomber. The plants at San Diego and Fort Worth increased output steadily, and the Army's demand for production was still so great that Ford at Willow Run, and North American at Dallas, also undertook to manufacture Liberators from Consolidated blueprints.

That the same Liberator model, modified, was also put into production as a cargo plane in early 1942 was an index of the pressing need. The Army was in no mood to wait for a specially designed four-engined transport to get on assembly lines. The shipping situation, plus various military factors, made the demand for vast air transport facilities immediate. It was clear that the Consolidated Vultee management could provide volume production of Liber-

Laddon's eyes are piercing and determined

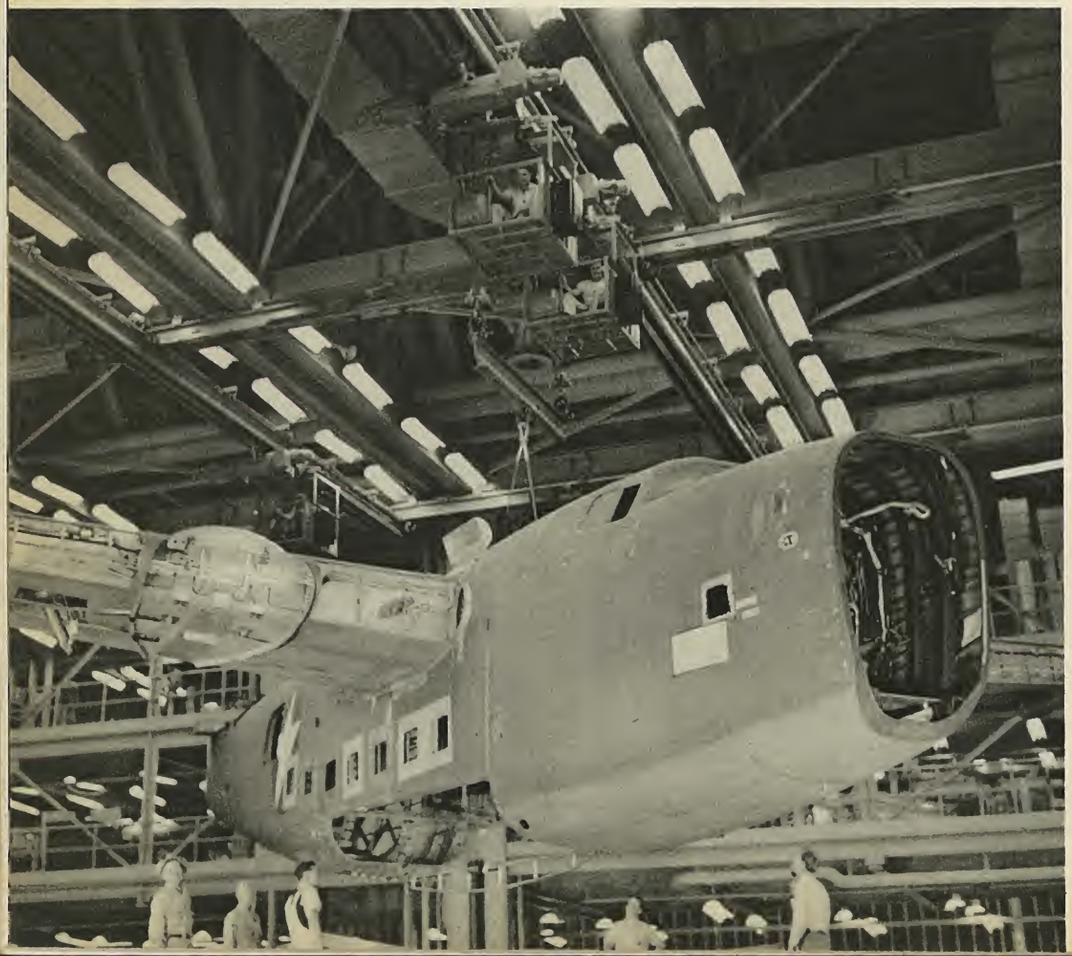
ator Express planes without in any w decreasing its output of Liberator bombe Large numbers of the great transports a now rolling off the assembly line at Fo Worth.

GREATER, by far, than the Liberator is new colossus of the air, designed by La don, which is now taking shape in t "mock-up" stage—the industry's term f a full sized wooden model.

This plane in its transport version w carry 400 passengers. Major General Ja my Doolittle was taken down the end vistas of Consolidated Vultee's San Die plant for a glimpse of it. The General w actually incredulous. "It's just a dam lie!" he said. "I don't believe it!"

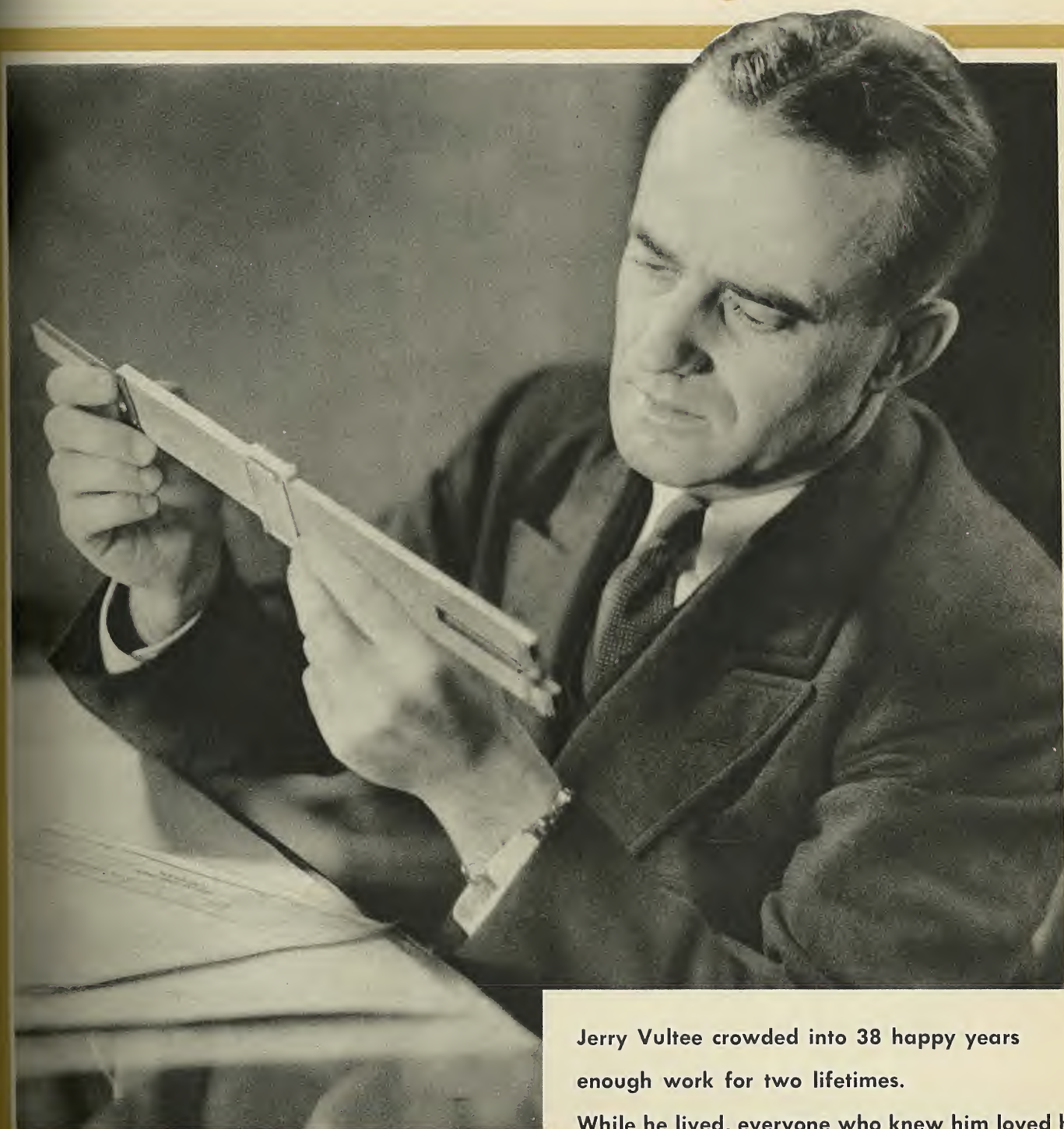
From the pure engineering point view there is admittedly no foreseeab limit to the size of the land-based plane. F from the practical point of view — a Laddon is above all practical—every pla is a definite answer to a question: "Wh do we want it to do?" The purpose, a the efficiency with which it is served, d fines the plane.

The Liberator bomber — designed high-altitude daylight bombing at exce ingly long range, and for precision w in conjunction with the Norden and Spe bombsights — is itself an illustration precision thinking. Other great Cons dated Vultee planes now on the way w be similarly designed to answer spec needs.



The Liberator, now in highly mechanized volume production, is Laddon's most famous design to date. It is a small ship, compared to a plane he is perfecting for tomorrow's production lines.

HIS OTHER NAME WAS *Jerry*

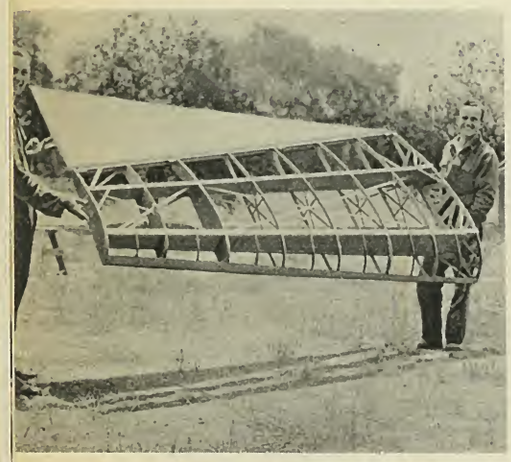


Jerry Vultee crowded into 38 happy years
enough work for two lifetimes.
While he lived, everyone who knew him loved him;
when he died, he left a tradition
and a name which are part of the proudest
legacy of Consolidated Vultee Aircraft.

This is Jerry at the age of 2, in his best white dress. His father was Henry Valentine Vultee, Treasurer of Lackawanna Iron & Steel.

The Lord Fauntleroy suit was not typical. Jerry wanted to be a fireman — his mother got him a red suit, and Dad got him a badge.

Jerry, standing here between Duke Kahanam and Owen Hale, loved to swim, was give watch by the L.A.A.C. for a heroic re



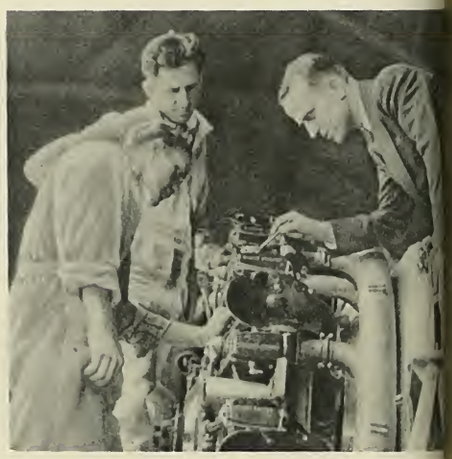
He designed a glider while at Cal. Tech; classmate Louis Keasling helped him build it. Jerry hoped to get a job in designing planes.

The T.A.L. really flew. And in 1926 Jerry did get a job in the engineering department of Douglas, made friends with Jack Northrup.

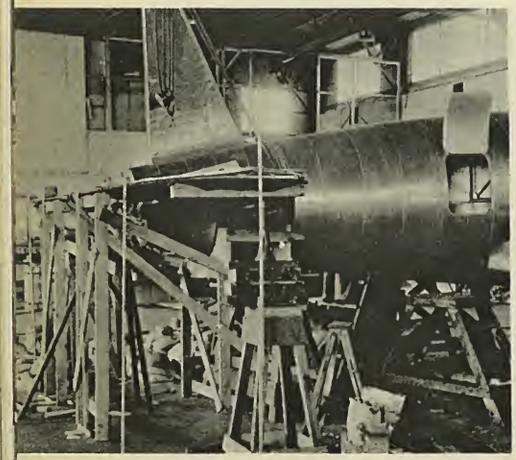
When Northrup went to Lockheed as C Engineer in 1927 Jerry went along as Pr Engineer. Meanwhile he learned gliding, fl

Jerry's friends soon included the whole Who's Who of Aviation. Here he shakes hands with Jimmy Doolittle, while Mrs. Doolittle looks on.

When the Lindberghs flew their Sirius around the world in the early '30's, Jerry was a helpful adviser. He stands here at Anne's left.



In 1932 Jerry found a backer, went to designing his own planes at Glendale, Here he is helping diagnose a sick en



Jerry and his men spent many a sleepless night creating the V1-A, testing it, taking out the bugs, making sure it was perfected.

Jerry in flight consultation with Van Stone, who with Duke Blue lost his life in searching for ways to make better, safer airplanes.

The first V1-A was a triumph; flight showed performance beyond all expect Orders flowed in; a production line was

His dream materialized. Wing after wing came off the line, was fitted to fast Vultee planes. They broke records; one flew the Atlantic.

He met Sylvia Parker while surf-boarding at the beach. Leland Andrews flew them to Mexico City on their honeymoon, helped celebrate.

Weather, last milestone in man's conquest of the air, caught Jerry and Sylvia in a blinding storm in Arizona. One ending, but . . .

Vultee Field Would Make Jerry a Proud Man Today

GERARD F. VULTEE started his work in 1932, in a hangar in the airport at Glendale, California. His first design was a single engine commercial transport, originally built for American Airlines, then also bought by other transport lines and individual fliers, who used it to hang up world records.

He modified the design to make a new attack bomber, which foreign governments ordered in large quantities from 1936 to 1938. The Soviet Government paid $2,000,000 for nine of the ships, together with manufacturing rights, blueprints, jigs and material. This expanding business caused Vultee to move his plant in 1936 to larger quarters at Downey.

Young Vultee died tragically in 1938, when the plane in which he was piloting his bride home from the east coast crashed into a mountain side.

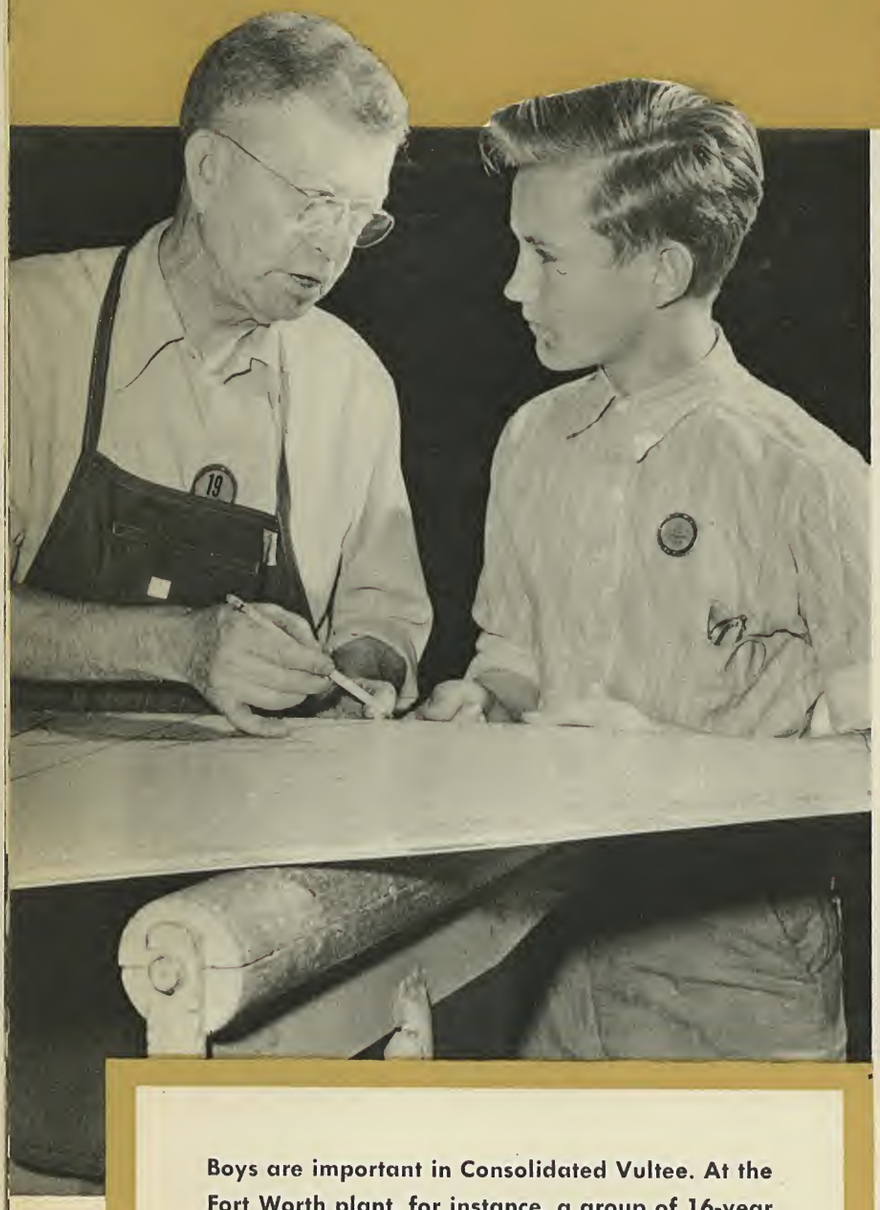
Just shortly before, the Vultee aviation properties were purchased by a group of industrial managers headed by Victor Emanuel. This was the beginning of the Vultee association with The Aviation Corporation, which Mr. Emanuel heads.

With Harry Woodhead as Chairman of the Board, the Vultee organization went on to become the chief supplier of basic training planes to the American armed forces. The Vultee properties were vastly extended, modernized, and reorganized to secure great volume production. With Vultee now a part of Consolidated Vultee Aircraft Corporation, headed by T. M. Girdler as Chairman and Harry Woodhead as President, Vultee Field at Downey remains the chief source of the basic training planes that school pilots for America's growing airpower.

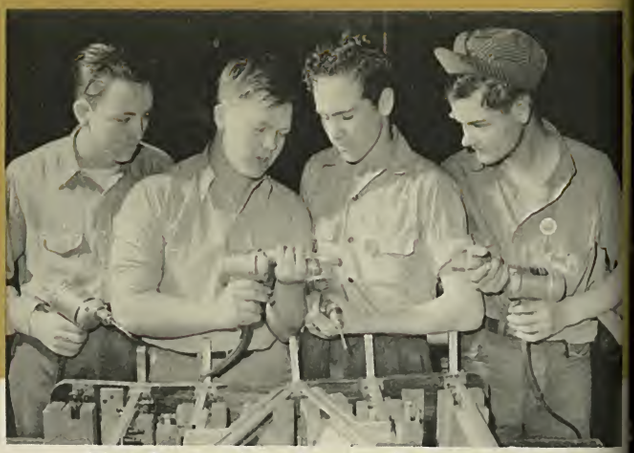
Jerry's work lives on. It was in this transport, his V1-A, that Jimmy Doolittle, now Major General Doolittle, made the then record flight from Los Angeles to New York in 11 hrs. 59 mins. Vultee Field since then has delivered to the Air Forces thousands of planes, built as Jerry would want them built.

These are Valiant basic trainers, today turned out at Vultee Field on one of the most highly mechanized assembly lines in the nation. They are used in training pilots for the Army Air Forces and the Navy, one of the most vital parts of the job in creating airpower for America that will be preeminent.

FATHER OF THE MAN



Boys are important in Consolidated Vultee. At the Fort Worth plant, for instance, a group of 16-year old lads who have either completed High School, or have been out of school six months or more, are helping in production. At the San Diego plant an apprenticeship system for young boys has for some months been in successful operation. At Vultee Field boys are running their own production line for model airplanes, needed in large quantities. Above you see a veteran machinist of 54, W. D. Gant, instructing Curtis Attebury, 16, in the Wing Department for Liberators at Fort Worth.



These boys are being introduced to electric drills.

Here is actual training in use of drills on metals.

The boys learn eagerly, soon make efficient "men".

These boys build model planes for use in the plants.

The Boss is an old airman, can handle a plane himself.

Radio Officer Holmes; Captain Ruggles; Captain Vanderkloot; Flight Engineers Williams and Affle

PILOTING MR. CHURCHILL

THE Boss often stands elbows akimbo on the flight deck, watching. Captain Bill Vanderkloot and Captain Jack Ruggles keep watch on instruments and controls. Sometimes the Boss tells them yarns about the lands below, and his unlit cigar droops from his mouth without tension. He doesn't mind bumpy weather — travels often through soup and fog because they are good shields against the eyes and the guns of the enemy.

That's the picture of Churchill on long trips in his Liberator, as it is sketched by Vanderkloot and Ruggles, his pilots. They call the ship "Commando."

Vanderkloot, twenty-eight years old, is from Sarasota, Florida. The British Government recently presented him with the Order of The British Empire for his work on installing radio ranges in England. Ruggles, native of San Francisco, got his flying training at Randolph and Kelly Fields as an Army Air Force Pilot.

Both joined the RAF Ferry Command before the United States entered the war, made many a hop to the four corners of the earth before they were selected to fly the "Commando" for the Boss.

Since then they have put in almost one thousand hours flying time on her. It was the second ship of this type ever built by Consolidated Vultee. She now has her fourth set of motors, and is still going strong.

THE "Commando" has berthed such folk as General Smuts of South Africa, Lord and Lady Halifax of England, Wellington Koo of China, Premier Sikorsky of Poland, Premier Nashas Pasha of Egypt. Anthony Eden recently used her to reach Washington.

The passenger cabin is surprisingly rough, judged by American airline standards. Lined with fiber board, it contains eight seats, a crude lavatory, a small hot plate, and two comfortable bunks located in a compartment above the bomb-bay. In this sleeping compartment, Churchill has had many a sleep on his way to inspect far British outposts, or to meet such confreres as Stalin or Roosevelt.

Vanderkloot and Ruggles speak of the "Commando" as a staunch and trusted friend. As Ruggles puts it: "In over 200,000 miles we have flown her, she has always given a little more than we really had a right to expect. We always carry a few spares such as collector rings, plugs, instruments and other parts we might need in a pinch. But we've never had any serious trouble with engines, equipment or ship She is tough, rugged, fast—and above all, dependable."

Sleeping quarters on the ship are modest.

RIDERS OF THE APOCALYPSE

THIS is the story of ten boys, all strangers until they came together at Davis-Monthan Air Base, in Arizona, to form the combat crew of a Liberator (B-24) bomber.

Here they choose a name for their ship, and learn its special idiosyncrasies before they take it into battle. Most important, they learn about each other. The final object of their training is to make ten men function as a unit, feel infused with just one soul.

Each boy has had previous specialist training elsewhere to fit him for his special work. Henceforth the life of each one will hang from the life of the others. They are entering a kind of blood brotherhood. The least gesture of one, or its omission, may decide the ultimate fate of all.

So it is a serious time for each of them. None of this is said. The boys eye each other with level eyes, talk pleasantries, and go through their routines.

THEY have called their ship "Apocalypse". Nowadays boys read their Bible.

Could you see Crew 247 gathered in the alert room of the 62nd group, 2nd Air Force, you would note all of them wearing the stripes of Sergeants, except four. Flight Officer Rhodes carries on his shoulder the F.O.'s bar. Co-pilot Hartley, Bombardier Smith, and Navigator Bowes wear the gold bars of Second Lieutenants.

Clyde Rhodes is clearly the boss. He has the strong and spatulate fingers of a violinist; can feel the moods of his men.

Coming from Texas where most men grow tall, Rhodes is shorter than others in his crew, sits on a cushion when at the controls. The boys were at first skeptical about the cushion, then decided Rhodes was all right when he made extremely smooth takeoffs and landings.

One day he didn't. When the crew disembarked, he called them together, then leaned over. "Kick me, each one of you," he instructed.

Nobody moved. They like their flight officer.

"Kick me, you guys, and I'm *ordering* you."

They did then, not too hard. "There," he said after straightening up, "that will teach me a lesson." On the few times since, when he made a bad landing, he has insisted on going through the same ritual. The boys are in the spirit of it now.

Rhodes is 24. His father was a professor of music. At the age of three the son was playing cornet solos at a band concert, at seven took up violin. When the father retired, the family moved to a Texas farm, and Clyde was a farm boy when he entered the Army in the Spring of 194[illegible]. First he was rated as a mechanic. The[illegible] they sent him to Curtiss Wright Tech[illegible] and he showed so much ability he wa[illegible] finally called for pilot training.

Crew 247 soon became proud of h[illegible] takeoffs and landings. They began puttin[illegible] a cup of water in the plane, and makin[illegible] bets with each other whether Rhode[illegible] could take off without spilling a dro[illegible] Often he doesn't.

At Davis-Monthan, where the Secon[illegible] Air Force trains only bombardment groups[illegible] most of the routine has consisted of spe[illegible] cially scheduled flights to develop crew[illegible] coordination — Bombing and Gunnery[illegible] missions, Instrument Calibration missions[illegible] Some of these start in the small hours o[illegible] the night, go on in rough and storm[illegible] weather, to accustom the men to all flight[illegible] conditions.

The two engineers, Tedone and Ropi[illegible] ski, always go to the field early to watch[illegible] the ground crew make its pre-flight in[illegible] spection. They still need more training[illegible] before they are themselves considered qua[illegible] ified to pass judgement on whether a[illegible] Liberator is ready for flight.

Armorer Gunner Powers, and Ta[illegible] Gunner Kania similarly watch men from[illegible] the Field's ground crew loading bombs—[illegible] for that is to be one of their own respon[illegible] sibilities in actual combat.

...and behold a white horse... and there went out another horse that was red... and lo a black horse... and behold a pale horse... And power was given unto them over the fourth part of the earth, to kill with sword, and with hunger, and with death...

REV. VI. 2-8

Then finally the motor is warmed up, and the crew climb in, single file, through the bomb-bay doors.

WHAT sort of boys are these, gathered from all points of the compass into the hull of one Liberator bomber?

Lieutenant Hartley, co-pilot, is 21, almost six feet tall, and towers above Pilot Rhodes. He has lived most of his years at Capitan, New Mexico, studied to become a civil engineer, quit college in his second year to work in aircraft, got his appointment as aviation cadet in the middle of 1942.

Bombardier Smith, unlike the Pilot, has no assistant. Smith is alone responsible for the use of the precious bomb sight. He is just 20, was born on a farm, and has spent all of his previous life in Middletown, Ohio. Like most of the others in the crew, he has had an active athletic youth. He was in the school band, played basketball, made records in Y.M.C.A. state swimming meets, became Aquatics director at the Y pool. He enlisted in early 1942, hoping to become a pilot, was finally made a bombardier instead. "After seeing my first record bomb hit the shack," he muses, "I was no longer sad about not being a pilot, but enthused about being a bombardier."

The Navigator is Lieutenant Pershing Bowes. Like Rhodes, he is 24. He has lived most of his life on Long Island. Before Army days he was a plumber mechanic, worked in partnership with his brother, a master plumber. He says, in his easy going way, "I went to parochial school and St.

★

Who are they, these airmen who yoke their lives to a Liberator bomber, and carry death into far skies? They are boys in their teens and early twenties, just like the boys you know in your own block at home. Here is the story of Crew 247 at Davis-Monthan Air Base, and what they are trained to do in the B-24 they call "Apocalypse".

For the gathering of the material Consolidated Vultee owes its appreciation to the boys themselves, and must further acknowledge its great indebtedness to the cooperation of the Commanding General of the Second Air Force, Major General Davenport Johnson; of the Commanding General of the 16th Wing, Brigadier General Robert B. Williams; of the Public Relations Officer for the Second Air Force, Capt. Robert M. Emahiser; and of the Public Relations Officer at Davis-Monthan Air Base, Capt. Frederic Finney.

★

tvigator Bowes and Bombardier Smith with Bombsight.

Briefing session of Apocalypse Crew in Alert Room.

Double bunks in the barracks are home for the crew.

Agnes High and to St. John's U., for awhile, and afterward, when my brother was persistent enough, I was forced to labor. So I've enjoyed life in its simplest forms—hearty meals from my old Irish mother; the usual dates; a few attempts to drink up the local liquor supply (unsuccessful); much hard work. I remember long vacations on the Long Island north shore—a lovely lonely beach . . . picnics . . . fishing . . . But there—I'm dreaming again!"

Navigator Bowes also has no assistant. But all the crew will be expected to learn some navigation for use in emergencies—just as all except the Pilot must be able to man the guns.

Navigation and radio operations are closely associated functions on planes with a flying range of 4000 miles. As one Captain told the crew after the boys had been trained awhile, "The Navigator gets you there—the Radio operator gets you back."

Sergeant Mike Castello, 22, is the radio operator. He comes from Manhattan. Trained as a diamond setter, he has some of the artist in him, draws pictures with skill, likes to write, is not ashamed of composing long poems to his faithful Kathleen back home. He refers to his family with glowing pride.

"My folks never did very well financially," he will tell you. "But we always managed to lead a mighty contented and happy life. Pop, who's now got a bad heart ailment, has always been a philosopher and a good guide to all of us; and after being away from home eight months, I can realize what Mom means to me. I have two older brothers also in service, and a younger brother slated to enter soon. Before I entered military service my radio knowledge was confined to tuning a broadcast receiver. Now I can receive code at the rate of 25 words a minute."

Castello is assigned an assistant radio operator, Claude Nixon, who also owes all his radio training to Army life. Sergeant Nixon, now 22, was born in Seneca, Kansas, and was graduated from High School there. After he was inducted into the Army in 1942, the Army selected him for a course in radio given at the Stevens Hotel, in Chicago, then put him through further training in aerial gunnery. He will have to assist the gunners on many occasions.

THE two gunners, Kania and Powers, are two of the vital reasons why the crew of this vastly complex Liberator will hope to emerge safely from attacks by fighters.

Kania is called "Career Gunner," and manning the tail gun is his exclusive function. This is the most uncomfortable place in the plane to ride, and is perhaps the most exposed, dangerous position on a plane in combat. Kania knows it. He is a lad with a brave background.

When he was a little boy of two, Raymond Kania was seized with infantile paralysis. That was in 1921, in Bridgeport, Connecticut. He grew up with enough strength in his legs to hobble to school, but no one expected too much of him.

Then, in the eighth grade, he was suddenly seized with a fierce desire to be like other boys. He tried to go swimming—and the other boys, instead of laughing, helped him. He spent hours in the swimming hole, often alone. Soon he was so good the boys called him the Muskrat. Then they let him join their games.

He also began hunting, fishing, hiking. He developed confidence, he began feeling a man among men. When his mother and father died, he and his brother and his older sister Jennie kept together as a family, pooled the income from their jobs. Raymond started in a handbag factory at $6 a week, worked in a grocery, did anything—painting, gardening, woodsawing, plumbing. He even started a junkyard, sold antiques, worked as a bartender. "And I did some gambling and drinking, too," he adds, to fill out a man's picture.

When war came along, Kania went down with his pal to enlist in the Army, without too much analyzing of the reasons. He marched off to training camp without ever finding quite enough courage to tell his girl Mae that he loved her. But when volunteers for airforce gunners were called for, he stepped forward immediately.

"And do you know what he worries about today when he's all alone out there in that tail?" remarks one of the Apocalypse crew. "About danger? Hell, no. He worries about Mae going with a corporal."

Sergeant Powers, the other gunner, usually works the waist guns. Powers is called Armorer Gunner because he is responsible for ammunition, for loading ammunition and bombs, for maintenance and repair of guns. He has disassembled, then reassembled, a 50 cal. machine gun while blindfolded, in just 6 minutes.

Walter Powers was born in Elkhart, Indiana, just 19 years ago; he is the youngest boy on the ship. Still a little shy, not voluble in talking about himself, he shows a skill that has already won the admiration of the crew.

One member of the Apocalypse has been appointed by the crew to keep a diary —this being in addition to the Pilot's log. Here is a diary entry that reports on Powers:

The pilot levelled off at 800 feet, called the crew over the interphone telling them to prepare to fire. Then the command of execution: "Fire at will . . . fire at will . . ." We could see the tracers streaming toward the target—the targets are full scale models of planes placed in a circle. The gunners enthusiastically led their targets and let go their bursts from the guns. Armourer Gunner Powers made the most direct hits. This nineteen year old gunner has made the most of his aerial gunnery training. In him we have the makings of a great gunner.

Four riders of the "Apocalypse" occupy "fixed positions" in the plane — Pilot Rhodes at the wheel, Navigator Bowes at his table, Radio Operator Castello at his instruments, and Tail Gunner Kania far out in the plexiglass tail shell. Co-Pilot Hartley has a seat for himself beside Rhodes; but, acting as Engineering Officer and pilot's assistant, he will have supervision duties that at times put him beside almost every crew member.

The other crew members, the engineers, will be on the move pretty constantly.

The two engineers, Sergeants Tedone and Ropinski, both love their job with the rough passion only mechanically minded men can pour out on giant mechanisms. Engineer Tedone is now 22. Youngest of three children, he was born at Hartford, Connecticut. He likes to recall that "before I started going to High School I was a real rough neck—school quieted me down. Nights after school I worked in a filling station, never thinking this would make possible a dream of mine — my dream to fly. It did teach me a lot about mechanics, and after leaving high school I went to an aircraft engine school, then worked in a machine shop. Soon I could set up my own machines. Then I got restless. In August of '42 I enlisted in the Air Corps. And if by any chance my next flight schedule should be my last, all I can say is, it was worth it."

Tedone, having a way with him, is the lady killer of the outfit. Crew 247 hadn't been at Davis-Monthan a fortnight before one of the girls he'd met casually in town began haunting the barracks trying to find him again. Tedone was horrified; the rest of the crew have been having wonderful jokes about it ever since.

Assistant Engineer Roman Ropinski, born in 1922 at Jefferson, Wisconsin, is another confident fellow who knows his way around. "When I started grade school at the age of six, I got into a fight the first day," he would have you know. "I've only lost one fight in all my life since. I studied Jiu Jitsu and boxed and did some weight lifting — worked as a carpenter, electrician, and a 'houseman' in a pool hall—I was admitted to the bar at an early age, and have been drinking my share ever since. Two months after my high school graduation I enlisted in the Airforce — after Pearl Harbor I stood guard with a tommy gun."

Ropinski has energy—he goes to church on Sunday mornings when the rest of the crew are so tired they lie abed, often reads B-24 instruction literature while others have bull sessions. He is also a resourceful fellow—he likes to tell how he replaced a whole wing on a BT13 when in training, then went up with the test pilot, on the maneuvers to prove the wing good as new.

"PILOT to crew . . . Pilot to crew . . . we're going up . . . we're going up . . ." The crew has heard that call through their earphones almost daily in their six weeks at Davis-Monthan, after taking their positions in the plane for another mission; they have been steadily instructed, scolded, praised, schooled; they have been routed from bed for flights at strange hours of the night; are now fast becoming a team to merit the approval of Major Burleigh, their Provisional Group Commander.

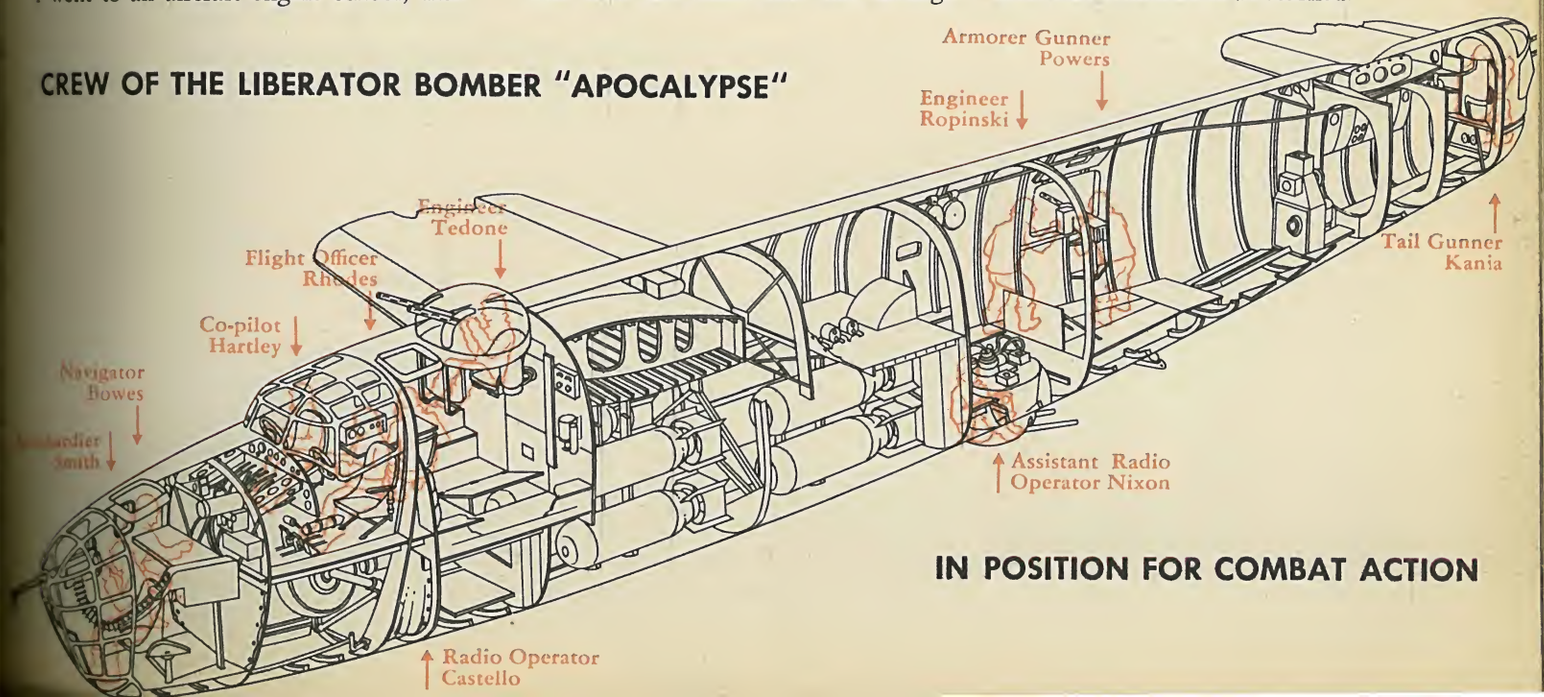
Lieutenant Rhodes has had his times for anger: "I've told you fellows in the waist position at least 20 times to keep your headsets and throat mikes on at all times during flight. Unless you keep in touch with me over the interphone I won't know what's happening. From my position I can't even tell if the superchargers or engines are afire. Negligence of that sort can easily lead to disaster."

He has been as quick to show his satisfaction. When the gunnery instructor reported good results, for instance, with special credit due Powers, Rhodes strode over and patted the grinning Powers on the shoulder.

There is something of the father-son relation between him and the crew, to be noted specially in those odd-hour talks when Rhodes leans back, smoking pipe in hand, and the boys listen intently while he tells some of the facts about planes from his own pilot lore. Major Burleigh has also won the devotion of the boys; he told them that crew 247 ranked among the best in his command.

Shortly after that, the Major announced the crew's departure from Davis-Monthan Field, and the approach of a new step in training. Crew 247, along with others, would leave Arizona for more advanced work in Texas. Six weeks of close discipline had done much for them—much more still remained to be learned.

CREW OF THE LIBERATOR BOMBER "APOCALYPSE"



IN POSITION FOR COMBAT ACTION

Ten year old Harriet Morrissey, at Nashville's School for the Blind, spends an hour a day sorting rivets, regards it as play, loves to help.

Hands to Salute

By John Tower

THE first thing that strikes you is the quiet concentration of all in the room. No one looking around to see who has just come in. No gossipy talking. They just sit and work. Some look down. Some stare straight ahead.

Then you notice the extraordinarily rapid movements of the hands. Hands seem to fly across the tables; from the boxes of mixed rivets, to the pans used for sorting, to the bins for the sorted rivets. None of the motion is lost; it shows dexterity comparable to the finger motions of a violinist. The rivets never fall; the hands never bump clumsily against any of the bins scattered about the tables.

You make an effort to remember that you alone see anything in this room. That all the workers are blind.

The Lighthouse for the Blind at Miami is in a pleasant garden spot not too far from the Intercontinent plant of Consolidated Vultee, for which the blind sort rivets. The gentlewoman in charge told me the workers feel a tremendously happy sense of vitality, since the plant showed them they were needed to help with the war.

People working there include a former mining engineer, a cashier from a local Western Union office, the wife of an official of the Florida Power and Light Company; one chap who has been blind all of his life. (Most of the rest have been blind a comparatively short time.)

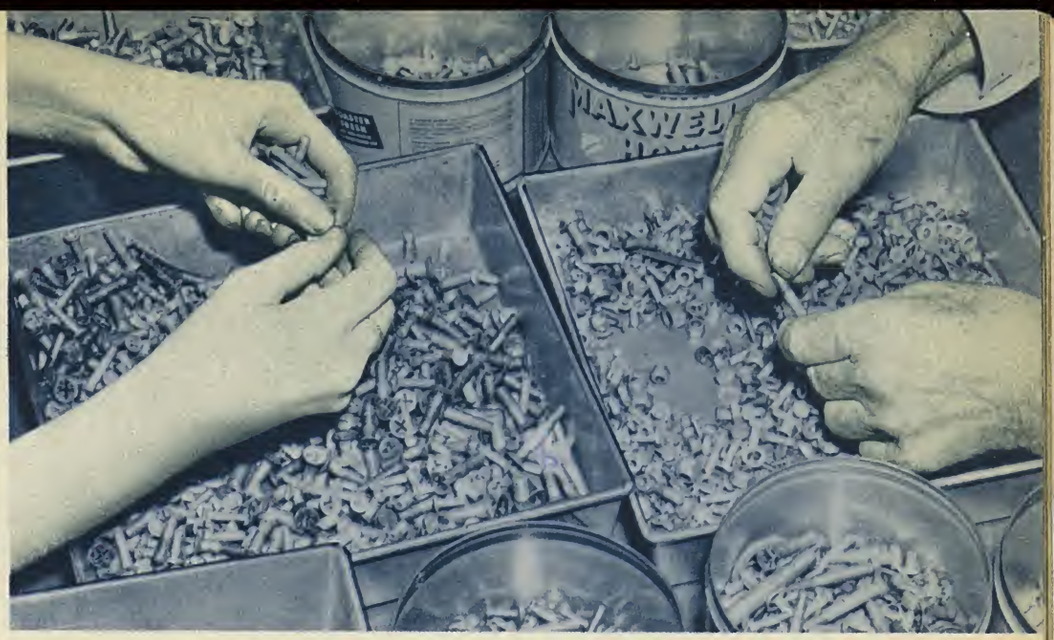
Sorting rivets, you must know, is a terribly important task. Thousands get mixed and shuffled in plant operations as workers use them—thousands drop daily and are swept up with refuse. All must be salvaged and sorted to prevent waste. Consolidated Vultee has found the hands of the blind workers ideally gifted for the task.

ONE of those at Miami is a little lady of about 50, mother of eight children. She has a son and a son-in-law in the air force. Her husband drives her to work each morning. She can distinguish variations in the rivet shafts of as little as 1/32 of an inch with her fingers. You and I couldn't detect that difference with our eyes, and we would make mistakes using instruments. She is almost infallible.

She is obviously proud of her work, and

she showed keen interest when I told her how the blind are helping Consolidated Vultee all over the country — how even blind children are finding a happiness in being useful that wrings your heart.

"Little children?" she asked. I described the Tennessee School for the Blind at Nashville where children like Harriet Morrasey, just ten and blind since birth, are sorting rivets with an eager pride in being of help to "grown-up people." "Yes," she answered, "and they are getting a training of their fingers that will be useful all their lives."



THE next woman I saw at the Lighthouse was a charming soul who can still distinguish light and dark but is, to all practical purposes, blind. She was working on a special rush job; it took some persuasion to get her away from her work.

I asked her how many pounds she could sort a day; she said that, depending on the size of the rivets, she could sort fourteen or fifteen pounds. I told her that girls who do that work in other factories usually average between nine and ten pounds and make from 5 to 10 per cent errors. She replied, with some feeling, that she would eat every rivet that was wrong in the work she did. According to reports, she wouldn't do much eating. She is the last one to handle rivets at the shop. When they get to her they have been separated from the other nuts, bolts, washers, etc., and sorted for head and shaft diameter. She sorts by length, entirely by touch, and is almost 100 per cent accurate.

One of the chief features of this work, say folks who want to help the blind, is the fact that they are able to earn a good week's wage — this being important from the psychological point of view. Whether they need the money or not the pay shows them they are of vital use in the world. All of them put in an eight hour day, five days a week. And there are no absences, except for good reason. They have a rest period in the morning and afternoon, and a lunch period. The rest of the time it is all work.

I talked to an elderly gentleman who seemed to have thought a lot about his position. This was evidently menial work for him, quite a come-down from his former job, and it evidently cost him some rationalizing to accustom himself to doing "unskilled" labor.

The hands of the blind can do some things far more swiftly and accurately than the untrained fingers of those who rely on sight, hence leave their hands untaught. Consolidated Vultee has a work program which assays all jobs to discover those which disabled men and women can handle. The important work of rivet sorting is something the blind love to do, and do extremely well.

He told me that he thought the conservation angle was most important — he was helping save both materials, and the man-hours of workers who could do other jobs. He seemed quite interested in the way his sense of touch had developed to the point where he could sort some of the time without a "gadget" to help him, although he did use it to check.

He said that nothing has absorbed the interest of the blind like the opportunity to do war work. Working regular hours for a definite rate of pay was a definite incentive, he said, and they had a feeling about this work they never got from weaving rugs or making chair bottoms.

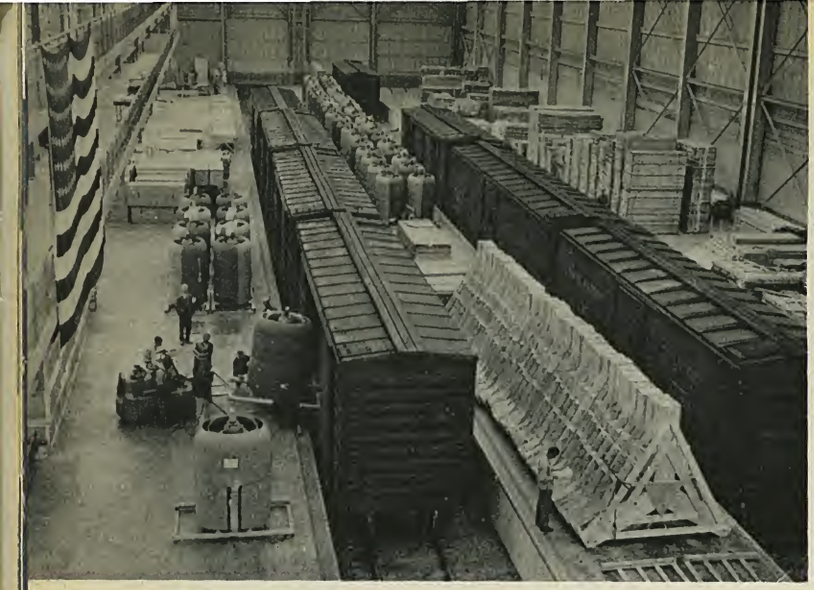
THE work is apportioned differently between men and women. The women get the little items; the men handle the big jobs. "We'd drive the men crazy in a week if we put them on these little rivets," the lady in charge told me.

I asked her how she got them all started, and she said she simply told them what to do, and helped them out when they needed help. Everyone was ready to say (at first) that this kind of work was impossible for blind people to do, except those who were actually blind. She has a theory that one job in seven is adaptable to blind workers, given proper instruction and guidance. And I believe it after seeing them work.

I Cole and Luther Coman work an eight-hour day.

The cheerful Lighthouse for the Blind in Miami.

Arma Jean Surbey sorts with deft fingers, seldom er

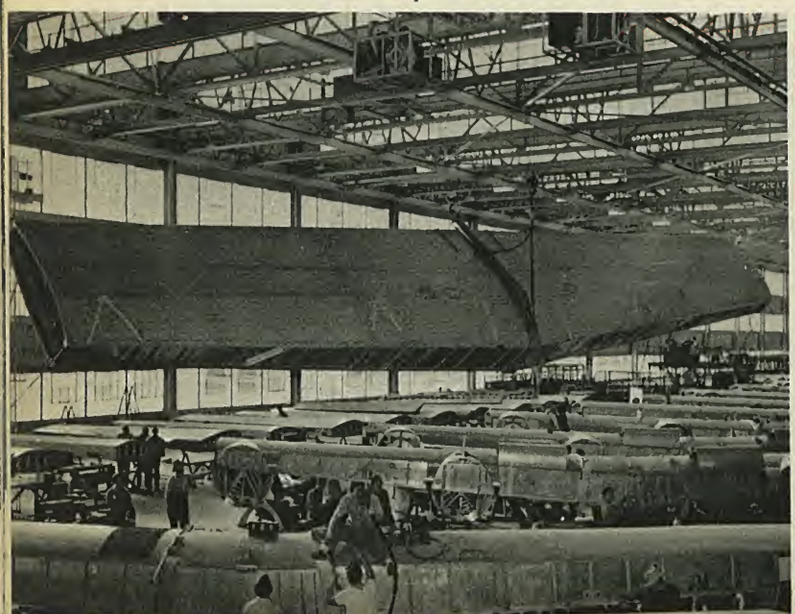


1 Freight trains bringing raw materials roll right into the plants, are unloaded systematically.

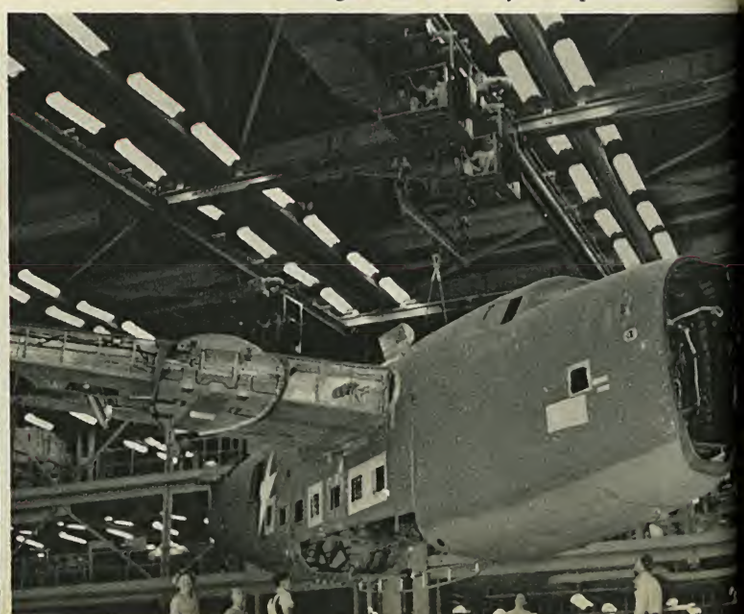
2 Supplies move through receiving and store rooms direct to fabrication on the production line.

Keep it Moving

Planes on final assembly line move on to next station at calculated intervals in the day.



5 Here a Liberator's center wing section is lifted to the monorail for transport to another area.



6 The monorail can shift whole Liberators to different working areas as assembly work proceeds.

3 Carloader run by women readily hoists freight on trucks for delivery to any point.

4 Small electrically powered trucks deliver materials to be fabricated, pick up parts in process.

EFFICIENT production is continuous movement — from raw goods to finished parts to assembly.

Movement at Consolidated Vultee plants means switch engines, railroad crews, car loaders, miles of track; it means giant trucks and little scooters; it means overhead conveyors that form one of the largest monorail systems in the world. This overhead railroad has cranes which lift single parts and entire assemblies, deliver them where wanted, set them down.

In just one plant, and just one month, 7,864,202 pounds of freight passed over the docks of the receiving department, then journied through the plant for processing. The figures do not include government-furnished equipment for Consolidated Vultee planes, such as guns. They do include items as various as tiny phonograph needles, and engines to pull Liberators through the air.

The raw materials pour into every plant daily, by railroad trains and trucks that come straight into the buildings. As many as 18 freight cars can come into one of the plants at one time.

Every delivery is counted, inventoried, and inspected before it is routed on its way — even the bolts and nuts. These are counted not by hand but by an ingenious scale, which balances two small pans against the weight in a third large pan. For each bolt in one of the small pans, 100 are required in the large pan to balance. For each bolt in the other small pan, 10 are required in the big one. Thus, if there are 23 bolts in one small pan, and 5 in the other, there would be a total of 2,350 in the big one when balanced accurately.

Plant aisles and grounds are carefully laid out to provide for the network of delivery and communication systems.

The carloader is a tractor-like vehicle which can run a couple of forked arms under a box, tilt it backwards, raise it as high as nine feet from the floor, then carry it to the desired spot and stack it neatly.

Pony express trucks, battery powered, carry half ton loads at a speed of 6 miles an hour, also pull a string of trailers, each carrying a similar weight. These are routed on schedule—such as unloading a freight car, then carrying the stock to the sheet metal bench, there picking up a load of cut out parts to be taken elsewhere for bending and drilling.

Moving people, as well as materials, must also be arranged for. Thousands of hours of valuable production time are saved in the Fort Worth plant by a trackless trolley which slowly moves up and down the aisles, never stopping. Employees can jump on, ride to their destination, hop off. So large is the plant that 15 minutes are needed to make the round trip from end to end. For executives whose time is most valuable, there are individual scooters available.

7 When Liberators roll off the production line into the yard, they are flown away under their own power.

8 Small planes can be crated. This is a Vengeance, packed in lumber enough for a 4-room house.

Boys in the Air Force and the Navy, learning star identificat
at the New York Planetarium. (The public is welcomed, t

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Not in Our Stars, Dear Brutus

By Navigation Officer Douglas Hembrough

THAT was the conclusion of Navigation Officer Hembrough, when he lost his bearings, and almost lost his Liberator, over a waste of ocean. Here he tells you about that trip, and how it led him finally to the New York Planetarium, where air force and navy personnel are now taught to recognize all the guide posts for world travel by a wholly new and easy method.

Navigation Officer Hembrough is in the Air Transport Command, carrying vital cargoes to our forces abroad. He earned his pilot's ticket before the war while with a utility company, was refused enlistment in the Air Force because of his age, became an A.T.C. navigator instead. He has two children at home in New Jersey, gets home only occasionally to tell them strange stories about other children half way around the globe.

OUR Liberator express was on a trans-ocean night flight of some 1500 miles. Our first stop was to be an island of some 30 square miles — just a pinpoint on the map. It was a night flight since it is easier to obtain your positions by several stars than by taking a single line of position from observation of the sun.

I was in the navigation quarters, as usual. Let me say that I consider the navigation quarters on the Liberator the most comfortable and practical of any plane which I have flown. It's a good ship for the navigator's work. When you hear that a Liberator can fly at high altitude, remember this means you can usually manage to rise above dirty weather and take a bearing on the stars.

Just before take-off we checked our equipment and discovered our automatic direction finder out of order. But we had planned our flight to make a landing at dawn; there was no time to change the equipment.

We debated briefly, and decided to make the flight by relying solely on celestial navigation. Then, within a half an hour of our estimated time of arrival at the island, we could ride the radio beam into the field. That was the plan.

We climbed to our predecided altitude, then levelled off. All motors were working like a watch; our indicated air speed showed the engines performing perfectly. At the expiration of one hour's flying time, I obtained a three-star fix, plotted our position. It showed our ground speed as anticipated, but because the wind had changed, blowing from a different direction than forecast, our position was south of our intended track. I gave the captain a new course to steer, to offset the drift.

Then we checked our rate of fuel consumption for the distance travelled, using the range control chart, commonly known as the "How Gozzit sheet." This is one of the most important records kept on a flight that offers no refueling bases along the way. A sine curve is plotted on a chart, using as data the pounds of fuel aboard, distance to be flown, and fuel consumption based on the prevailing winds, at a given altitude. This tells how far you can proceed and still turn back with a reserve of gas. Our observations showed us our correct consumption and our intended reserve.

But now we ran into an overcast — fog all around us. Ordinarily a Liberator can rise far above any prevailing weather. But our load was heavy—we couldn't gain any more altitude. From this point on, our position had to be deduced from data collected in our last position check, with allowance for ground speed and wind direction. This is known as dead reckoning. It is accurate only so long as ground and wind directions remain constant. But with our other radio equipment, we knew that as we neared our destination we would be able to pick up the beam from the airport.

NIGHT was still all around us, gray night. The whole world was a cloud in which we saw nothing except an occasional dim star. We flew in this fog for about four and a half hours. It was almost dawn when the flight engineer gravely told me we had developed trouble. Our batteries had run dry, and were cooking. Now we were unable to use any electrical equipment or lights. Our whole picture was suddenly changed. It was absolutely vital now to know our exact position. Our island must be near, but in the haze few stars appeared. Those I did glimpse showed for such short periods I could not identify them.

As I tried again and again to see a star I knew, dawn came, and the stars died. A pale sun moved up the horizon right on our course. But — how far were we along that course?

Now our estimated time of arrival had already expired. This meant we had passed our destination, that we were now heading out over the ocean. All the crew knew it, and were silent. Perhaps they were trying to

Pilot and Co-Pilot at controls of Hembrough's Liberator Express

picture what Eddie Rickenbacker and his men did, when they were lost in the same way.

Now two alternatives were left us. One was to perform a "square search" for our island. In this procedure the pilot is instructed to fly two minutes longer on each third leg of a square; in this way an increasing territory can be searched. Second, we could continue on our known course until the sun was high enough to let me take a sight and plot a line of position. After consulting the range control chart and finding the amount of gas that we had left, we decided upon the second alternative.

The sun was rising dead ahead. This meant our line of position would show the distance travelled; we could determine how far past the island we had flown. The flight engineer milked the engines until it seemed we were just flying on the gas fumes. And finally I was able to plot an accurate sun line of position. We decided to risk the batteries for a few minutes, and radio the island to take our bearing from them. As long as I think of this flight, I will never forget Radio Officer Jack Lannin for the speed and accuracy with which he handled the situation. He got his spark; the island got our message. By taking the reciprocal of the bearing which the island gave us, and crossing it with the sun line, we were able to plot our position accurately. Then the captain was given a new course to steer.

I found we had passed our island eight miles to the north, unable to see it through the haze. From then on, I plotted sun lines as rapidly as possible. Each subsequent line showed our Liberator steadily approaching to the island, and finally we made our landfall.

That was a happy ending to what might have made us either dead men or heroes—and no man in his right mind wants to be either. But for me it was really a beginning of a task. When a man fails, it is only natural and wise to ask how that failure could have been avoided. Not only my own life, but that of all our crew, had been in jeopardy — because I could not read the few pale stars the night had allowed me.

I knew then that all the navigation I had learned was useless unless in emergency I could identify a star by its position without reference to other constellations. Had I been able to do this on that flight, I could doubtless have plotted some sort of a position. I decided to learn to recognize the stars in their changing positions for all the different times of the night.

It was a naval officer who told me about the Hayden Planetarium in New York City. Anyone looking for an interesting experience, irrespective of profession or interests, should know about its classes in star identification.

The Navy is now sending contingents of men there regularly, and men in the Air Force are discovering it too. Yet the public, which is also welcomed, will find its courses in star identification as easily grasped as does the service man. After all, star lore was the first of our sciences — simple shepherds in the fields mastered it. The planetarium makes it easier than most men would believe.

Never have I received such valuable instruction and paid so little for it. It actually costs less than attending a movie. And the value received is immeasurable. The unique feature of this planetarium is that the heavens are projected on a dome, so that you get the feeling of looking at the actual sky. The sky can be duplicated for any latitude for any time of the night.

It was possible, for instance, for me to give the latitudes and time of the flight when we were lost, and then see literally duplicated those stars that had been showing faintly through the haze.

I started my learning there, and I know I shall never fail to recognize those stars again. By graduating the light, the planetarium heavens can be made clear or misty, can show literally thousands of stars or one. By changes in projection, the heavens can be projected as seen from any spot on the earth at any hour of the night, and at any time of the year. Nor is it too difficult, I assure you, to reach the point where you can have a starry sky flashed upon you and answer the question, "Where are you?" The right answer might be a spot in the southern hemisphere near Australia — or a spot on the other side of the globe. Once you learn to recognize your stars, you will readily know.

Mariners for hundreds of years have sailed into the night with utmost confidence and explored uncharted waters navigating solely by the position of the heavenly bodies. Most of them were simple untutored men. Today any lad in his teens and every adult, can learn far more about navigation in two months, with the aid of modern invention, than old mariners learned in a lifetime.

In the past, the subject of celestial navigation has been looked upon by the average person as a mystery beyond his understanding. But this global war into which we have been plunged has exploded the myth. Today literally millions of men are tossed across the wildernesses of the earth. Any one of them can get lost, at any time. But when that happens, they have only their own ignorance to blame.

The fault, as Shakespeare said, is not in our stars.

Liberator Navigator shooting the stars with a Link Bubble Octant.

REVENGE IS SWEET

LIBERATORS BOMBING JAPS

Bombs dropping from Liberators on the Japanese base at Nauru herald more to come. The South Pacific Air Command announces its use of more Liberator bombers in its area, to get their longer range, larger bomb capacity.

★

MADE BY WOUNDED VETERANS

Wounded veterans home from the fronts now help speed Liberator production at Fort Worth. *From left to right:* Thomas Jones, Midway veteran; Marcus L. Norman, RAF Aerial Gunner; Lonnie S. Smith, Pearl Harbor Survivor.

TRIP TO P

Dmitri with one of the north airmen, watching a takeoff.

Photo

Dmitri

By Ivan Dmitri

WHEN it's far enough below zero you cease feeling how cold it is. Some zero level exists for misery, and below it flesh does not register. I have seen a mechanic, for instance, working frantically in the gray light to warm up a Liberator, unaware that two solid white spots on his frost bitten cheeks were slowly widening.

I carried three cameras, deep in my clothes near the skin. Two would stay warm, while I drew out a third just long enough to snap the shutter, then put it back to have its turn at animal heat. Even metal and glass have limits of endurance.

At America's air bases in the far north, our pioneers have had a heart rending time. This can be said now, because already in a brief span the many obstacles have been overcome.

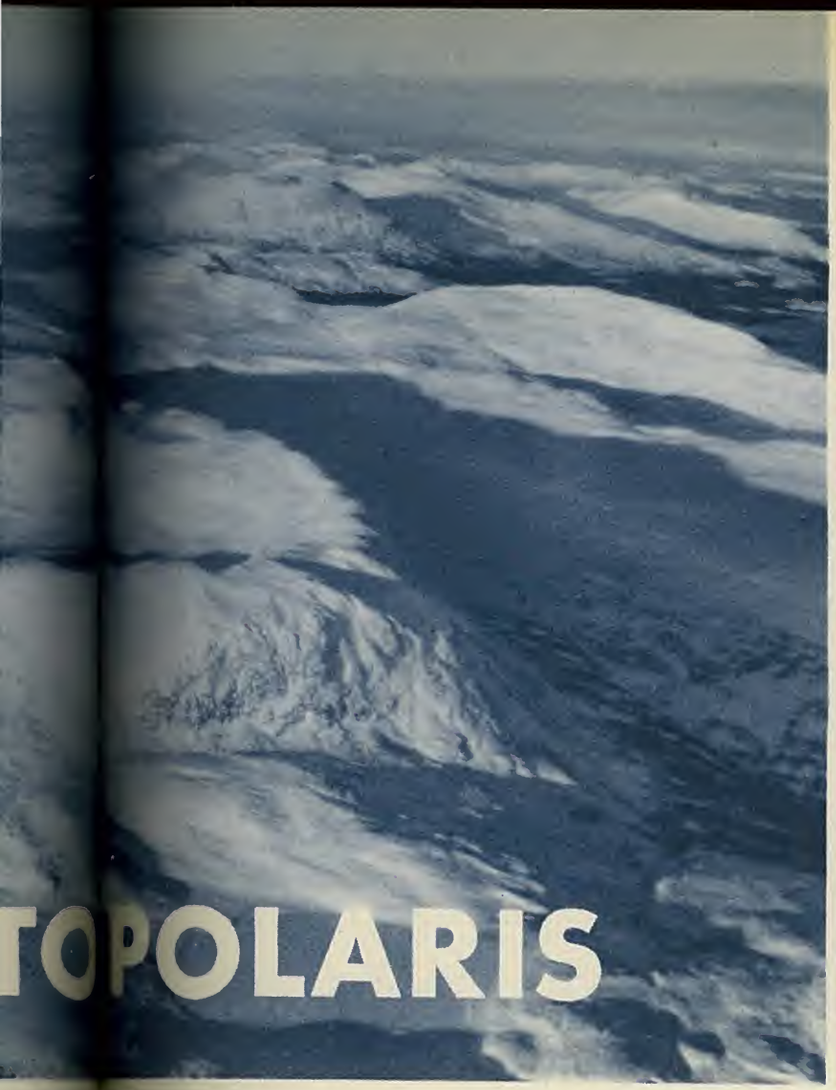
Remember, they started building in the ice wilderness from scratch. Every steel mat laid on the ice for runways, every tank for gas, every crumb to eat, had to be brought in by ship and plane in summer, by air alone in winter. For months, in many places there were no hangars.

But flight crews still had to arrive and leave on schedule, through lavender skies shot with the green of Northern lights. the maintenance and repair work on planes still had to be done, the lost rescued, the gas tanks sunk, the towers erected, the paraphernalia of mechanized life set up.

Today the boys have running water and toilets in their barracks — barracks steamily overheated, to compensate for blizzards outside. Imperative hangars are being completed in which planes can be warmed. Linemen, working on high poles and towers under the protection of canvas bags, have now erected a good part of the wire which will broadcast weather reports to the navigators. When you casually make the trip yourself after the war — the route will be your shortest to northern Europe and European Russia — you will do it in the lap of comfort.

THE far north still can be frightening because to most of us it is still so strange

Ivan Dmitri, distinguished American photographer, flew toward the pole star to take pictures under the auspices of our Air Transport Command, which is establishing bases throughout the far north. Still little known to most Americans, this heroic task of the A. T. C. has been one of the most extraordinary developments of today's global war. The cargoes carried by Liberator Express planes into areas completely desolate have done much to make it possible.



The iceberg a mile below is perhaps four city blocks square.

I remember huddling in a Liberator Express, miserable in a world of 40° below, and wondering at the nonchalance of the crew. It was a hop of some 800 miles between bases, scheduled for the brief hours of the dim, far northern day. There had been no hangar from which to start; the cold motors lagged; every molecule in the great machine seemed to be shivering. But slowly we gained altitude, levelled off in fog with no visibility above or below.

Sitting shivering in my sheep-lined boots, pants, parka and helmet, rooted to the belly of the plane, I dozed to forget my discomfort; I awoke suddenly bombarded by an ungodly noise as if bearings were being burned out of all four motors at once. It was only ice sheering off the wings, and hammering the plane as it passed, but it sounded like doomsday. Later I learned that the de-icer works in this way; the ice is allowed to accumulate, then is suddenly broken off. For the moment, I could only hold my breath.

The hand on which I had slept was in agony; it was asleep and almost frozen.

Three thirty P.M., heavy snow. Saying goodbye to the mascot before a night flight.

As I tried to bring it to life, the air all around us began to flame. I had often seen fire trailing for a foot or so behind a plane's exhausts — but now flames full four feet long were flowing from every motor. And the huge Liberator, leaping and diving among great pockets between the winds, was, for all I knew, diving thousands of feet straight down to earth.

I had heard tales of men lost on the ice for days—of still others lost and never heard from again. I pulled myself together, stumbled forward to the crew's quarters, found the incomparable pilot, Chuck O'Connor, and his men drinking coffee completely unconcerned. All that had frightened and discomforted me was for them daily routine. They explained the huge flames—a rich mixture of gas and full throttle to escape icing conditions.

We made an uneventful landing on a flight strip of steel laid on a glacial moraine, passed the night in quarters heated by little stoves dotting the central aisle between the bunk pens.

IT is at night that these airports hum feverishly. Sundown comes at three in the afternoon. Plane crews bound for Europe and America pass here, swap stories and reports, get their machines serviced.

If you are an early arrival yourself, you will be among those rushing out to welcome newcomers. There may be a blinding snowstorm. And the winds can blow at a force of 190 miles an hour. Still the planes come in—first the droning scream of motors in a sky your eyes can't penetrate, then the plane's sudden appearance. The ground crew and mechanics rush up from nowhere. The mail truck driver has already opened the door before the crew can disembark, to seize the precious letters.

It is a sight to see a great Liberator come in with the convoy of fighter planes it is shepherding across the ocean in short hops, like a great mother bird with chicks. The Liberator crew does all the navigating—the fighter pilots need only follow the leader. Most always they make the trip safely. When one does fall behind, to get lost in the arctic night, the convoy goes on; but radio enables a plane from the nearest base to go out and make a search and possible rescue.

There have been hairbreadth escapes, and some heroes lost. I remember talking long one night to a boy who wanted his picture specially taken "for the folks". ("You'll send it home for me, now sure?") Some inner feeling told him a secret withheld from the most of us. "I'm not scared," he reassured himself. "But sometime soon, perhaps, I won't be coming back. It's almost time now."

He was briefed to make a rescue search the next morning. He went to bed at 6:30 for an early start. I took his picture in the strange light of the next dawn, and he went out in that little plane of his, carrying skis, to hunt for the stranded comrades. And he was never heard of again.

IT is all a man's world. In a base with scores of hundreds of men, there were just two women—invaluable nurses. Of a gang of boys passing one woman on their way to mess, the nearest lad might attempt a hasty fondle; it was thrust off with nonchalance, and a teasing jest, nothing much was thought of it. But let any lad try to walk out of the room with one of the women, and he was immediately surrounded and quarantined by a group of others, all chaperoning to see that no partiality was shown.

The boys at one base tell a story on themselves with good-humored resignation but with an air of, "Ah, if it might have been." Some 1800 men had been on duty months without relief, when a ship bringing 40 WAAC's was reported at the dock. "Not a WAAC is going to leave that ship," announced the C.O. And not one did.

The natives, of course, are completely outnumbered by our men, and provide small enough interest for them. Most native I saw were a strange combination of Eskimo, Indian and Scotch—Scotsmen were early mariners in these parts.

Ships can reach practically all of the seacoast bases in Labrador, Greenland and Iceland during the summer months, and the supplies they bring this year will mean still more comforts for our men in these latitudes next winter.

Many of our men there, strangely enough, are southerners. Having never experienced northern snow, they asked for this service, and thrive under the rigors of the life. And though these rigors are being reduced, the men who finally come back — and not all of them will — will each be a hero. As one commanding officer said to me, "It would be much easier for me if I could send my men out against an enemy they could kill."

Back in the comfort of a New York studio, my sheeplined flying gear in the closet, I remember those men as something a little more than human, performing the incredible tasks demanded in this bleak, cold world. I wonder if, one day, we shall take for granted those arctic air routes they are building out of the very best they have to give.

Mechanics of a ground crew in the far north warm up in the mechanic's shop and swap adventures.

Pants Presser Into Dryer.

United We Stand

In one small Los Angeles woodworking shop, where radio cabinets once were made, a pants presser has been converted into a machine that dries airplane parts. One of California's most distinguished architects now helps Consolidated Vultee by making $100,000 worth of tools, dies, and stampings a year. A plant that once made auto trailers turns out elevators for planes. An ancient machine shop with equipment 50 years old is making precision parts as fine as those produced anywhere in the nation.

Multiply such instances a couple of thousand times, and you begin to glimpse the ingenuity that's helping build American airpower.

Necessity, in the shape of events that moved many a man to lie awake wondering how to go on making a living, has undoubtedly helped the ingenuity to spark. Here's an instance. Angelus Store Equipment, Inc., used to manufacture bar fixtures for some of the more hoity-toity Los Angeles restaurants and night clubs. Came priorities, and the business of making glistening bars was deader than a dodo.

But Earl Fifer and Sam Larner, proprietors, still felt much alive and meant to stay so. If they could make all those complicated bars in palmier days, why couldn't they turn out something for airplanes? They could, said Consolidated Vultee. Today they are making ailerons for the Valiant, which is the basic trainer used by most of America's pilots. From their original 8400 square feet of space, the partners have moved to a building with 30,000 square feet, and have recently hoisted a new sign reading "Angelus Aircraft Corporation".

Building great planes demands great human organization. That means not just one corporation like Consolidated Vultee, but thousands of small enterprises linked in a common task. Tom Girdler said recently that 2100 different suppliers and manufacturers, scattered all over the country, furnish the 102,000 parts needed for each Liberator. Many had a mighty modest beginning, as this story shows.

Countless similar instances have outcomes so uniform that they sound like movie scripts.

Scene I: The Gillcraft Furniture Company is averaging $50,000-a-month gross, as the climax of years of building satisfied customers. *Scene II*: Postman drops in the slot a Washington order curtailing use of metals of springs by 50 per cent. *Scene III*: Mr. Gillcraft, previously still hopeful, now learns that new draft regulations make his craftsmen reluctant to do any labor not

Frank L. Martz, left center, and employees in the shop behind his filling station.

listed by the Government as essential. It looks as if Gillcraft's will lose all. *Scene IV*: Gillcraft's does. Postman delivers death blow in official order curtailing use of essential hardware. *Scene V*: Airplanes fly this manufacturer right up to heaven. Five months after he starts production of aircraft parts, he is doing a $65,000-a-month business, with a backlog of $100,000 in orders for ailerons and vertical stabilizers.

Some business men have gladly abandoned old activities and joined aircraft production just because they saw the vital need. Consider Mr. Casper, for instance. Across the tracks from Consolidated Vultee's big San Diego plants is the Casper Aircraft Institute. There Mr. Casper operated a school for aircraft workers, agreeing to charge nothing for the courses unless the students were placed in jobs. A few months after a large group of women had completed their studies, Consolidated began hiring women in quantity, and all of Mr. Casper's girls blithely went to work. Being a man of foresight as well as a veteran of World War I, Mr. Casper had an idea. If he could train girls to work, why not get orders for production and put them to work on his own payroll? He decided that his equipment could be used to make electrical harnesses. Consolidated Vultee was glad to give him a first order — after all, a producer was even more important than a teacher. Now Casper has just gotten a new order many times larger than the first, for harnesses, and is operating three shifts. His original small shop has been expanded to take in the premises of a former lunchroom next door. The large stove in the old lunchroom is today being used to heat solder. Girls sort electrical harnesses for Liberator bombers on the old lunch counter. And — climax — Mr. Casper has now married his lovely office manager, who still handles the office administration.

SHOWING the small manufacturer how he could make himself highly useful is a job which Consolidated Vultee has handled in a very personal way.

When, for instance, it was decided at Vultee Field that metals must be saved and plastic and wood parts substituted wherever possible, a real man-hunt for wood workers was conducted.

The supervisor of sub-contracting got into an automobile and started looking. He carried with him a list of furniture manufacturers from coast to coast. But he also peered sharply out of the car windows in every likely town. It was in this way, behind a sign announcing a combined garage and carpenter shop, that he spotted his first convert. The sign led him to a towering, shaggy Holland Dutchman named Frank L. Martz.

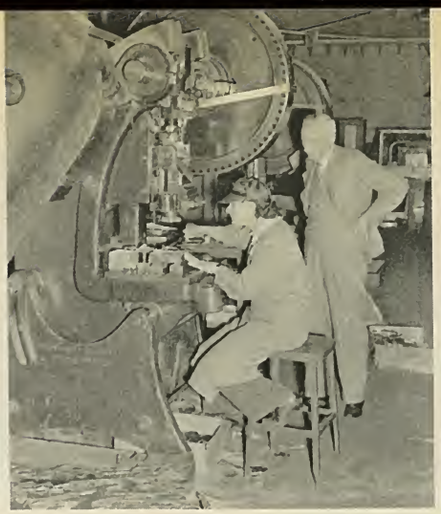
Martz had never even been close to an airplane. But he did know machinery, he had some, he knew how to build more and he loved to work. Further, he was broke and willing to try anything. Martz was helped in getting a loan from the bank and shown how to fashion parts needed. Then he started; today he employs twenty-two women workers in two shifts, in a tiny shop behind his gas pumps. Nine of the machines he built himself on a "production line" of his own design. He has a $4000-a-month business, and the Consolidated Vultee insignia on his wall is his pride.

Whenever a manufacturer needed financial aid, and seemed to deserve it, efforts were made to see that his needs were met. There turned up a little group of airmen, for instance, who had worked out a plan of material, but had no market for it and no capital to produce it with. They were

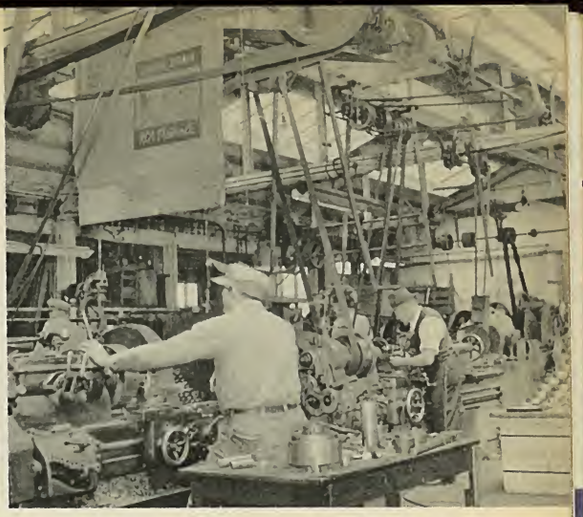
M. L. Gillespie, second from left, in his furniture shop that makes vertical stabilizers.

Down with Store Equipment, on with Angelus for Earl Pifer (left) and partner Sam L...

Casper and wife Helen, in the ex-lunchroom annex.



A. T. Heuckendorff, American patriot.



Fifty-year old machinery at San Diego Machine Company.

commended for a loan to the Federal Reserve Bank. They then took over a small plant which had been desolated by priorities and today are busy on plastic flaps for Consolidated Vultee planes.

No equipment is too old to be useful, if the man owning it has the know-how and the will. For more than thirty years, Charles L. Kessler manufactured deep well pumps of his own design in his plant, the San Diego Machine Company. Kessler thought he had little to offer. His machinery was fifty years old. What could he make on antiquated lathes with whirring belts? Consolidated Vultee showed him. He is building retracting trunnions, stabilizer attachments, bomb levers and bomb release latches. His ancient machinery is demonstrating how well its makers put it together for another generation — these old machines are today holding to tolerances the thickness of a cigarette paper, just as their modern counterparts are. Kessler designed one needed machine out of the rear end of a 1939 automobile. It performs four duties automatically, and has turned out 10,000 exhaust rings in a year.

Conversion of resources to the war effort has undoubtedly made hundreds of businesses more important than they ever were before. The Langley Instrument and Machine Company used to employ sixteen workers, in producing those shiningly efficient tools for surgeons which most laymen just shudder to think about — sinus probes, rib spreaders, forceps, scalpels. Today Langley makes gear boxes for Liberators, Catalinas, and Coronados, and is the largest manufacturer of this kind of mechanism in Southern California. It employs 235 workers and is still growing.

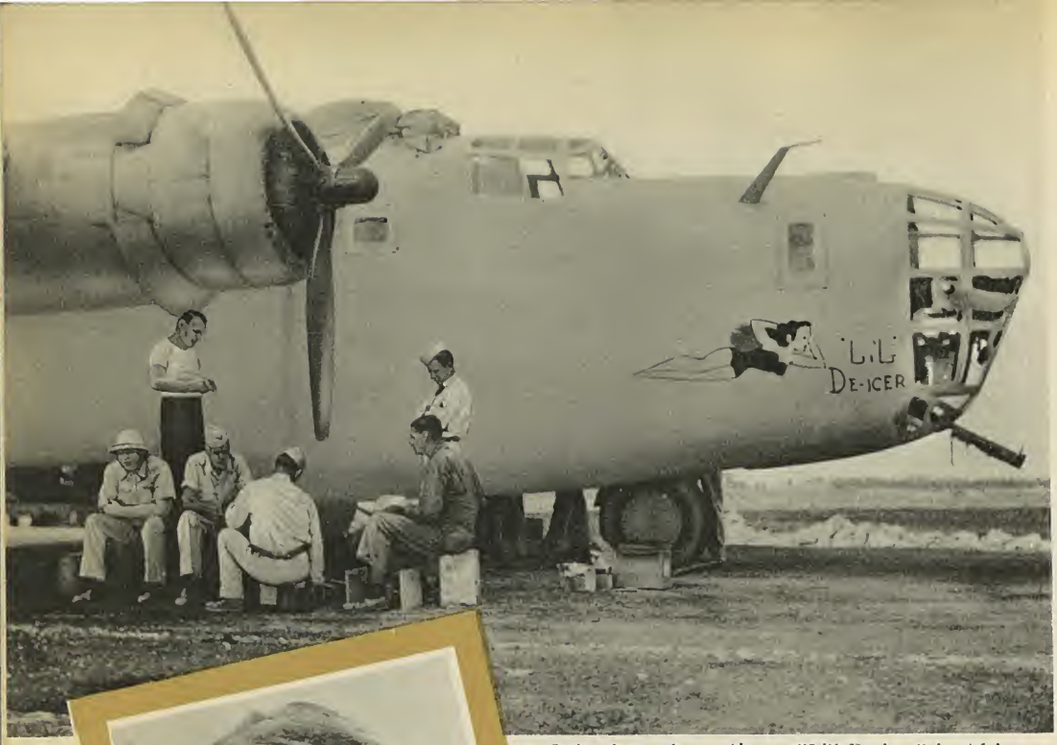
In Consolidated Vultee annals is one story of a patriot whose help to the aircraft industry has been nationwide. He came out of wealthy retirement to ask Consolidated Vultee what was most needed to help American aircraft answer the Axis challenge. His name is Arthur Thomas Heuckendorff; he is a veteran of twenty-nine years' service in China with the British American Tobacco Company.

He was informed that junction boxes were providing the worst bottleneck in the industry. "If you want a problem to lick," said the Chief of Materiel, "try that one".

Heuckendorff sank thousands of dollars — his own dollars — in experimental work on methods to produce junction boxes quickly. He was trying to overcome the need for riveting or welding them, by developing a deep drawing process.

He put almost his entire fortune into experimentation. His two brothers-in-law Cassius and Armstead B. Carter, put funds in, too. There was a happy ending. He finally did perfect a deep drawing process, and one bottleneck was wiped off the map. From employing eight workers, Heuckendorff's Monarch Tool and Instrument Company has now grown to an organization of 135. Its floor space has been quadrupled since it was given a first contract by Consolidated Vultee in 1940. And it now provides junction boxes for the entire American aircraft industry.

Shop of E. J. Baume, distinguished architect, now manufacturing parts for aircraft.



Left: the author. *Above:* "Li'l De-icer" in Africa.

Lieutenant Doug (Henry Douglas) Chism has been bombardier on the famous Liberator, "Li'l De-icer" in a heavy bomber group that in six months got 96 enemy ships on the Near-East front, performed many bombing missions in helping cripple Rommel's supply bases. Based first in Palestine, moving on to Egypt, Chism's crew were among the first to hit Naples, Tripoli, and Navarino Bay, Greece. "Li'l De-icer" once flew back on three motors with 87 flak holes in the fuselage; her crew were all awarded the Silver Star for exceptional bravery under fire. Lieutenant Chism is 25, a native of Memphis, Tennessee, and a former student at Southwestern University there. He has recently returned to America, to help in the task of giving new Liberator crews combat instruction at the Pocatello (Idaho) Army Air Base.

BOMBS AWAY

By Lieut. Henry D. Chism, Bombardier, USAAF

THE Norden bombsight not only is one of the most effective and destructive devices yet invented — it is also one of the great saviours of civilization that will emerge from this bloody conflict. That's my considered opinion after watching it work.

The Germans, for instance, declared our planes killed many civilians when we bombed military objectives in places like Antwerp. I want to say that bombing of civilians and non-military objectives virtually is unheard of by planes equipped with this miraculous sight.

In nearly 30 combat missions over the African Middle East when we were attacking convoys, ships in harbor, and dock installations almost incessantly while smashing Nazi General Rommel's supply lines, I saw only three bombs hit inside of a town, out of the millions of tons of explosives our squadron dropped. And don't forget we were bombing almost always from an altitude above 20,000 feet — frequently reaching the five-mile bracket.

Most of the dread of going into a target is anticipation. While over the target you're too busy to worry — and after leaving you experience the most indescribable feeling of happiness, and exultation in a job well done.

A person who never has been through such a mission never could understand it.

Li'l De-icer's bombs must have killed hundreds of members of the Nazi armed forces, in sinking ships and destroying docks. But at several miles up in the air it all seems very impersonal to you. You have a job to do, a target to hit, and when you hit it you just remember that you've blasted that target and completed a mission.

A bombardier's role — due to the bombsight — in reality is small.

In the Middle East we would start our missions — usually a 2,000-mile round trip — about 10 o'clock in the morning. We'd reach our target about dusk, decreasing possibility of pursuit location and attack before darkness.

I'd sleep most of the way out — there wasn't anything else to do. The Norden bombsight is mounted directly behind a special piece of thick glass, in the bombardier's compartment in the nose of the plane. It has three ball-like elements encased in black metal. One element contains the telescope and its adjusting machinery, a second the gyroscope, and the third is located directly under the gyroscope.

As we neared the target I would set the altitude and air speed. The bombsight would do the rest.

The bombardier talks the pilot in, telling him which way to turn, and using evasive action, until approximately 25 to 30 seconds are left for the run. Then he directs the pilot straight in on the target and proceeds on the run, meanwhile having raised the bomb-bay doors and completed his selection of the bomb levers.

Coordination between the eyes and the hands is the most important single item to make a successful bombardier.

The enemy undoubtedly has captured

Position of the bombardier in the Liberator.

veral of the famous Norden bombsights, Col. John P. Kenny, commandant of the forces bombardier school at Midland, Texas, has permitted some of the details be told. As John Mecklin said in reporting the first description of it for the United Press, this is no cause for alarm, because would take Axis scientists two years or more to duplicate the bombsight. Since Mecklin's description was "cleared" by high officials, and was very accurate, I'm going to quote from it here.

THE Norden sight has several thousand parts. Cadets learn enough about it to make superficial repairs, but neither cadets nor anyone else could take one apart and put it together again without months of careful training.

Taken apart, the sight becomes a great confusion of mirrors, prisms, lenses, gears, cams, wires, bearings and countless other tiny parts.

Once a bombardier gets the sight trained on the target — and it takes you only about 25 seconds of level flying to do that — the bomb literally can't miss.

Here, roughly, is how the bombardier uses the sight:

Before beginning the run on the target, you set the bombsight for the chosen altitude and air speed. You adjust its gyroscope to spin with its axis perpendicular to the ground, line up the sight with the plane's true direction, and prepare the bombs for dropping.

When the run begins, the bombardier takes command of the ship. Squinting through a telescope, which is part of the sight, your objective is to line up two cross hairs inside the telescope so that they intersect across the target. Then you adjust the sight so that, even as the plane moves forward at three or four miles a minute, the cross hairs automatically stay on the target.

The sight does the rest. It has been synchronized to the chosen altitude and speed in such a manner that if the plane is put on the proper course the cross hairs will follow the target.

In lining up the cross hairs, the bombardier uses four knobs which he manipulates with his right hand. Two of them bring the telescope to bear on the target; the other two adjust the ship's course to jibe with that bearing. The sight adjusts the course automatically for cross-wind drift.

The course can be controlled either by a device attaching the sight to an automatic pilot (which guides the ship mechanically as the bombardier twists his knobs) or by a "pilot direction indicator". This last, which we use in combat because it's faster, moves a needle in the cockpit as the knobs are turned, and shows the pilot how to adjust the course.

After you set the cross hairs at the point where they appear to be stationary on the target, you have done most of your bombardier's job. You shout "bombs away!" through the interphone to the pilot, who takes over the ship and heads for home.

OF course it's not quite as easy as it sounds. It takes considerable practice to learn how to adjust those cross hairs. The problem becomes slightly greater at high altitudes because the apparent motion of the target is less. But once adjusted, the Norden sight is almost as accurate at 25,000 feet as it is at 5,000.

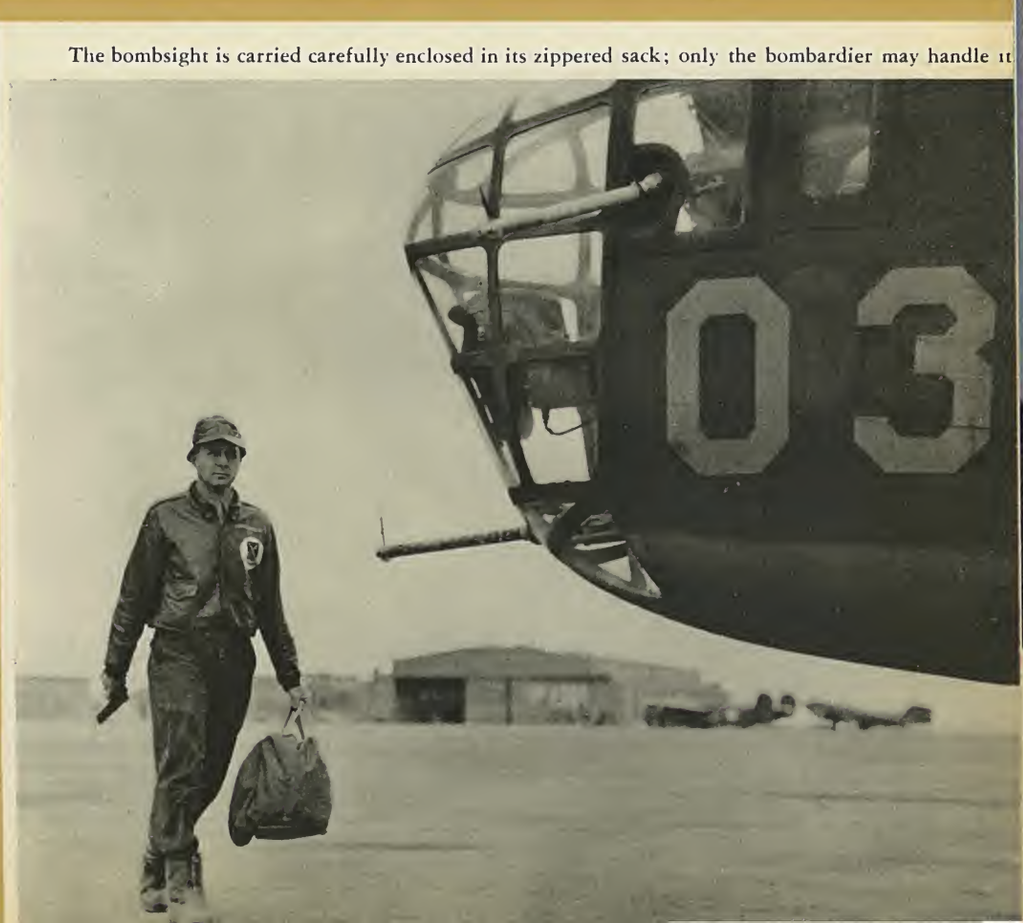
There is little difference in the operation when the sight is used to bomb a moving target, such as a ship or railroad train. Here again, the telescope is trained until the target appears to be fixed at the cross hairs' intersection.

The sight under such conditions automatically makes compensations for three motions — the plane itself, the plane's drift sideways if there is a cross wind, and the target's motion.

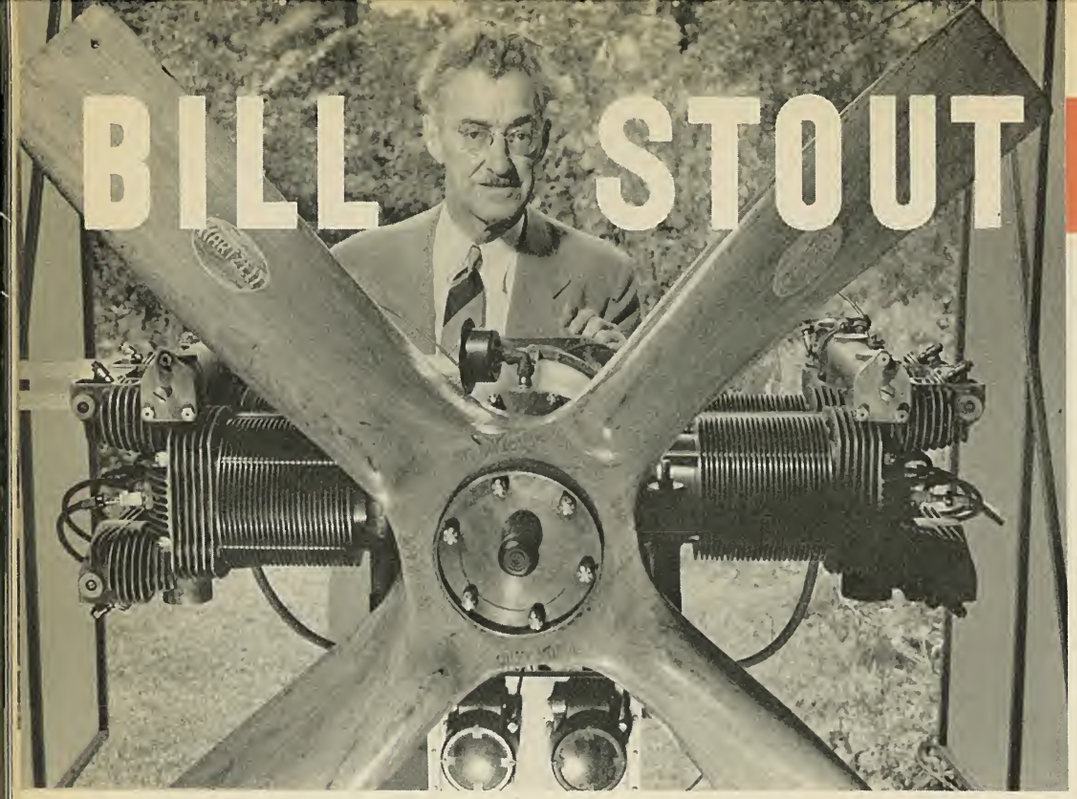
The Consolidated Liberators equipped with Norden bombsights are tops. British Air Marshal Tedder, supreme commander of the United Nations air forces in the Middle East, spoke for all the men who know when he said the Liberators are "worth their weight in gold".

Our planes are doing a job, and the Norden invention really is what it's "cracked up to be". The only possible error would be the human element. And when we spot the enemy we don't miss him. Not by a bombsight.

The bombsight is carried carefully enclosed in its zippered sack; only the bombardier may handle it



BILL STOUT



His theme song is "It ain't necessarily s

WILLIAM B. STOUT has fought a one-man war with the past for 35 years, almost ever since he left the University of Minnesota.

He gave the United States its first thick wing plane, then the first all-metal airplane that eliminated planes put together of glue, wire and wood. His Scarab automobile, built in 1935, incorporated numerous ideas which the automobile industry first said wouldn't work, then adopted one by one. His work on streamlined railroad trains has been bringing on a revolution in railroad economics. His research on a new air machine (which he refuses to call a helicopter) may someday mean as much of a revolution in air transportation.

Stout says nothing is really invented — that invention is simply a matter of challenging old assumptions, by conjuring up a new assumption on which to base research.

It was this approach that led him to design a theater seat which slid back to let a person pass, after concluding the accepted answer to theater seat construction had been wrong all along.

STOUT has long been impatient with aviation, and knows what he wants to do about it. His association with Consolidated Vultee, which began in 1942 when the company acquired his Dearborn laboratories, suggests some interesting developments.

Stout was born in Quincy, Ill. in 1880, was burning with interest in aviation before out of his teens. In 1912 he became Aviation Editor of the Chicago Tribune. In 1916 he was named chief engineer of the aircraft division of the Packard Motor Company; here he started to work on a plane to carry the old World War Liberty engine. In the middle of this enterprise, in 1918, he moved to Washington, became technical adviser to the National Aircraft Board.

He submitted his principles of airplane construction to the Board. Summed up, they amounted to this: If the wing of an airplane is the only part that lifts, then — for efficiency — why expose anything but the wing? He cited the air resistance offered by protruding wires, struts, radiators and landing gears on the airplanes of that day. Said he: "The de Haviland wastes 237 of its 400 horse power in pulling these extruding parts through the air." He presented the Board with a plan for a plane eliminating such impediments, illustrated with his own drawings. One showed a racing motor boat pulling a log behind it. The Government bought his plane.

It was the first internally braced cantilever airplane of veneer and wood ever constructed in America. As a result, the Stout Engineering Laboratories were founded. There, in 1919, Stout built the first American commercial monoplane, his historic "Batwing."

Later he founded the Stout Metal Airplane Co. By 1926 it had built 15 eight-passenger trimotor, duralumin planes. H sold out to Henry Ford, immediately ob tained Ford as one of the backers of th Stout Air Services, which provided market for the planes. For four years th airline operated between Detroit, Gran Rapids, Cleveland and Chicago, carryin more than 200,000 passengers without fatality.

TYPICALLY he began to look for oth fields to conquer. He built the Scara automobile, which he called "ten ye ahead of its time." Then he turned to ra roads.

Result was the Railplane, built in 19 for the Pullman Company. It was the fi streamlined, light weight, high speed, gas line driven train in America constructed welded steel tubing covered with dura umin. Then, after conducting tests the Union Pacific's first streamlined tra Stout turned to aviation again.

First notable outcome was the constru tion of his "Sky Car II." His preceding "Sk Car I" had been built in 1931 for t "Golden Era of Aviation," which Stout f ured was due. The depression demonstra otherwise.

"Sky Car II" was the first stainless ste all-welded flivver plane; Stout designed to sell for around $1,000 in volume pr duction.

Fire in a hangar destroyed it. Stout now rebuilding it in still more mod form. He is convinced the light plane the plane of the future, then adds that t possibilities of the helicopter are also t mendous. His new helicopter should be the air before many months pass.

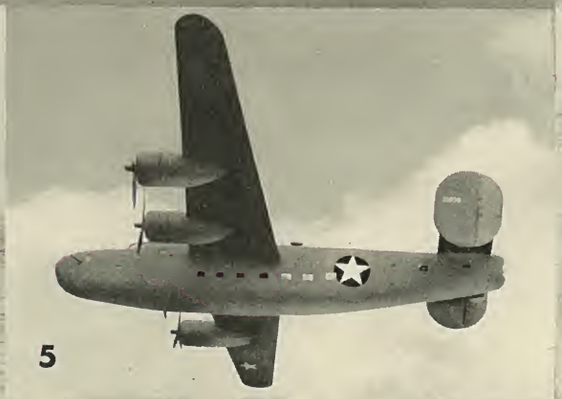
He calls this the "Skycycle," because operator sits straight up on a seat w much like a motorcyclist's. Pictures ca be published now, on grounds of be military information. Stout hopes the m chine will sell in the motorcycle pr range. He refuses to call it a helicopt for he believes it will develop more f ward speed than helicopters have yet tained. But under any name, it promi to maintain his reputation as a convent breaker.

PLANE SPOTTERS' TEST

ON CONSOLIDATED VULTEE PLANES

2

3



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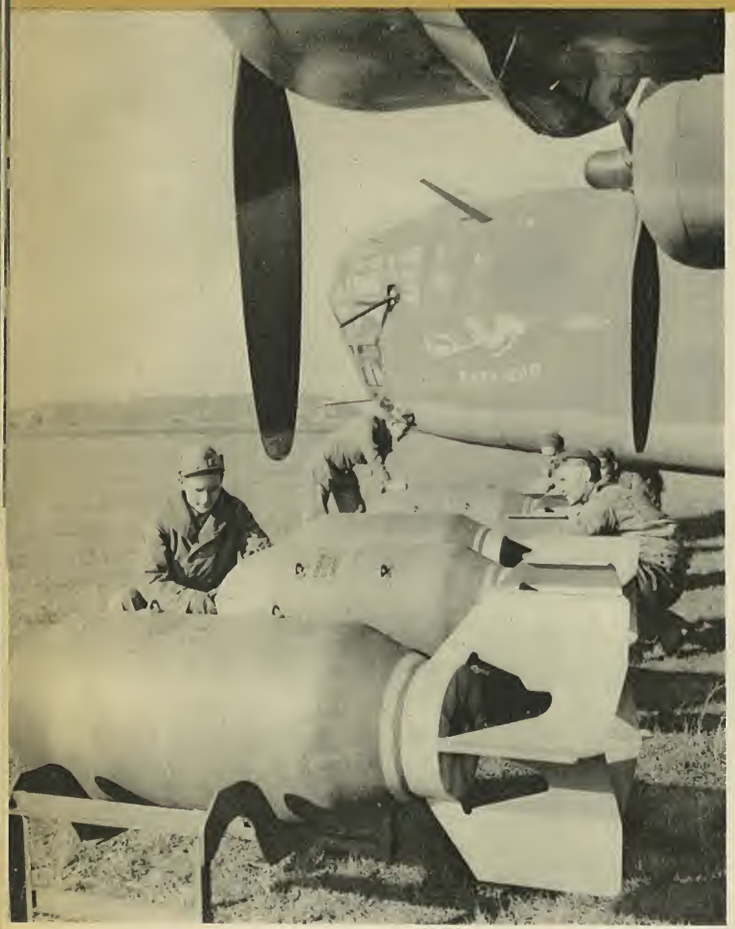
9

CLEWS THAT MAY HELP:

1. is just going into production at New Orleans. **2.** is so old it was thought outmoded, now proves so useful that the Navy has just ordered another $30,000,000 worth. **3.** is one of the only two four-engined land bombers built in America. **4.** is a giant even larger than (3) and is used by the Navy as bomber and transport. **5.** is a kind of Liberty ship, operating in the air ocean. 6. has been hailed as a veritable flying jeep. **7.** is used, both by the Army and Navy, more than any other plane of its class. **8.** is a dive bomber. 9. is now being made especially for the British, under Lend-Lease.

Hold page to light for answers. ➡

BOMBING BUSINESS



British Combine

Above: Liberator in England, bombs primed for loading.

Below: Italian airfield in Tripoli, with Liberators overhead.

British Official Photo

{See Preceding Page}

1. The Navy's P4Y
2. Catalina (PBY)
3. Liberator Bomber (B-24)
4. Coronado (PB2Y)
5. Liberator Express (C-87)
6. Stinson Sentinel (L-5)
7. Valiant Basic Trainer (BT-13; BT-15; SN-V1)
8. Vengeance (A-31)
9. Stinson Reliant (AT-19)

U.

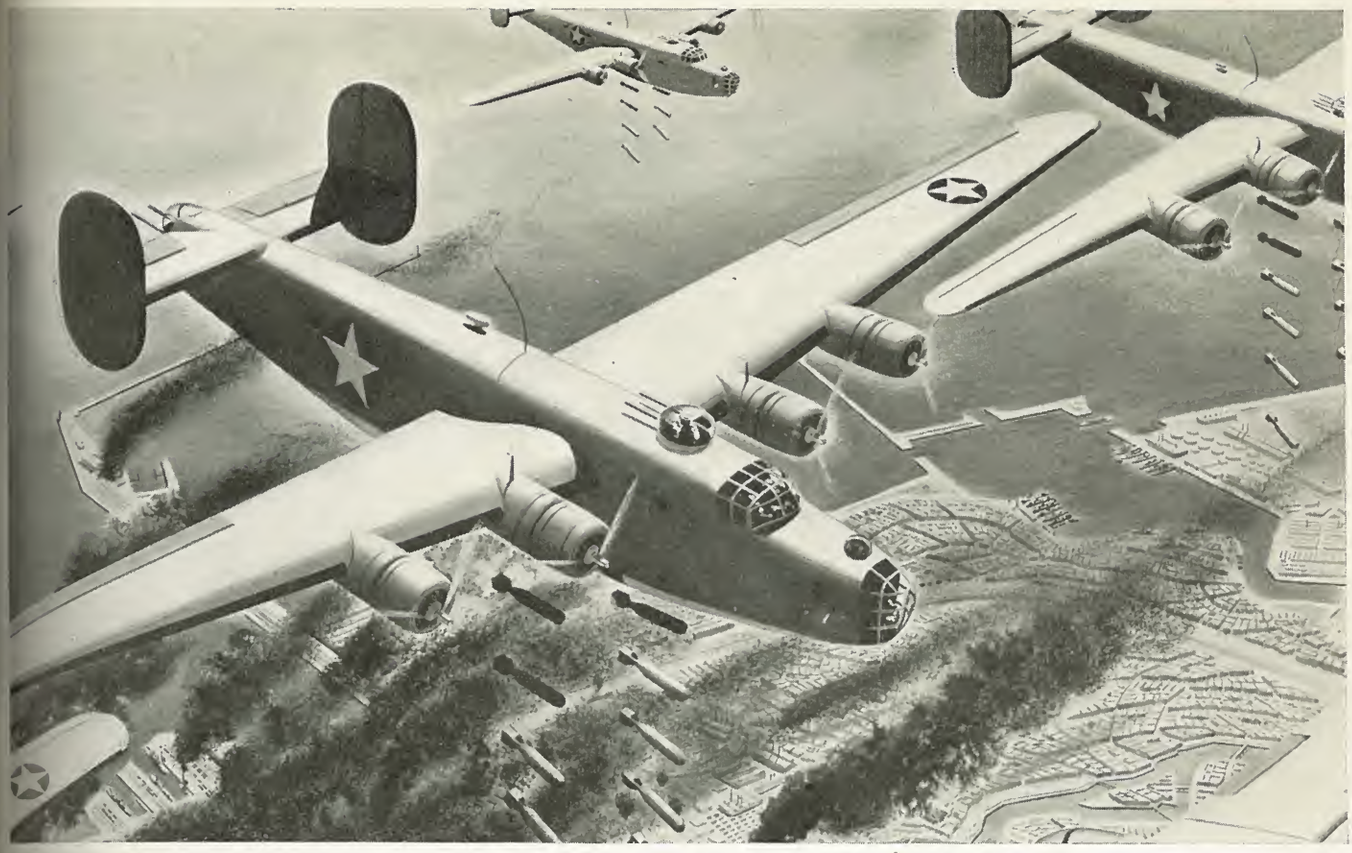
Liberators over Africa winging to bomb Axis convoy in Mediterranean sea.

U. S. A

Armament Officer in ground crew checks a cargo of bombs before loading.

British C

American bombs stored in dispersed spots in England, for Liberators' use.



WAR LOG OF THE LIBERATOR

DAILY, the war log of the Consolidated Vultee Liberator—huge, 4-engine, long-range American bomber—grows longer.

On all our global battle fronts, these multi-ton bombers are pounding the Axis.

You have only to scan your newspaper headlines to spot reports of the Liberator's work from the Mediterranean to the Aleutians, from Burma to Germany, from the South Pacific to Nazi-occupied Europe.

WAKE ISLAND—
Liberators in 2000-mile round trip, drop 24,000 pounds of bombs on Jap-held Wake Island.

NORTH PACIFIC—
Liberator bombers blast Jap-held Kiska in 13 raids, score hits on ships, runways, and camp areas.

SOLOMON ISLANDS—
Liberators drop heaviest load of 2000-lb. block busters ever to hit Rabaul. Large fires seen for miles.

BURMA—
Liberators bomb Rangoon railroad yards, dump over 30,000 pounds of bombs. Another formation drops 60,000 pounds on oil refinery at Syriam and Jap-held mines at Namtu.

NORTH AFRICA—
Liberators, maintaining a "shuttle bombing service," pound Nazis' Mareth positions in more than 500 sorties.

GERMANY—
Liberators bomb Wilhelmshaven for third time in one of heaviest attacks of war.

FRANCE—
Liberators pound Nazi U-Boat pens at Brest and Lorient, start fires, hit power station. More than a score of enemy fighter planes destroyed.

SOUTH PACIFIC—
South Pacific Command announces Liberators being used to replace other warplanes, because of longer range and heavier bomb-load capacity . . . waves of Liberators join in aerial attack on huge Jap convoy, disable all 10 of its warships, all 12 of its transports, wipe out 15,000 troops, down 82 Jap fighter planes. Daring Liberator attack on New Guinea Jap Base, sets fires visible for miles — destroys 23 Jap planes.

ITALY—
Liberators resume round-the-clock pounding of harbor at Naples, score direct hits.**** Fifty Liberators drop 250,000 pounds of bombs on harbor installations and merchant ships at Reggio di Calabria, at "toe" of Italy.

SICILY—
Fifty U. S. Liberators, escorted by RAF fighters, bomb shipping in Augusta harbor. Twenty vessels hit.

MIDDLE EAST—
During past six months, long-range Liberators based in this area engaged in more than 5000 separate sorties totaling over 21,000 flying hours. They dropped more than 8,500,000 pounds of bombs, definitely sank 49 enemy ships, probably sank 25 others, damaged an additional 28. They definitely destroyed 99 enemy aircraft, probably destroyed 41 others, damaged 59.

CHINA—
Liberators arrive to form new heavy bombardment group for Fourteenth Air Force, give it weapons of longer range, deadlier fire power . . . Liberators raid Jap bases at Canton, drop 80,000 pounds of bombs on airport installations.

SUCH REPORTS, selected at random, highlight the job being done by the Consolidated Vultee Liberator—formidable 4-engine bomber.

For last-minute communiques on the Liberator see tomorrow's newspapers.

CONSOLIDATED VULTEE
AIRCRAFT CORPORATION

Designers and Builders of the Liberator • Member, Aircraft War Production Council

San Diego, Calif.	New Orleans, La.	Allentown, Pa.	Louisville, Ky.
Vultee Field, Calif.	Nashville, Tenn.	Tucson, Ariz.	Miami, Fla.
Fort Worth, Texas	Wayne, Mich.	Elizabeth City, N. C.	

From an advertisement of the Consolidated Vultee Aircraft Corporation

APOCALYPSE
CREW 247

Plane Talk

SEPTEMBER · 1943

THE NAVY'S "CATALINA" (PBY)

The Power We Now Have . . . . . *by Tom M. Girdler*

Giving Aviation A Future . . . . . *by Francis A. Callery*

Plane Talk

PUBLISHED BY CONSOLIDATED VULTEE AIRCRAFT CORPORATION

Front Cover

The Navy's Catalina (PBY)

Often called the workhorse of the Navy, and also used by the British, the Catalina is a long-range patrol bomber that is seeing vital action at points as far scattered as India and the Aleutians, the Solomon Isles and the north Atlantic. *(U.S. Navy Photo)*

Back Cover

Valiant Basic Trainer

Built at Vultee Field, the Valiant has been used in the basic training of most of the flyers in the Army, Navy, Marine Corps, and Coast Guard. Valiant basic trainers are also supplied to the services of our allies.

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Edited by Hill and Knowlton for the Consolidated Vultee Aircraft Corporation and published every other month. Text and pictures have been cleared for publication with Government authorities. Text may be reprinted with or without credit to Plane Talk. Copies of most pictures can be made available to editors upon request. While manuscripts are not solicited, first hand accounts of experiences by men in the air forces at the fronts will be given careful consideration. All correspondence should be addressed to the office of Hill and Knowlton, Room 3301, 350 Fifth Avenue, New York 1, New York.

The Power We Now Have

By Tom M. Girdler

One day in the winter of 1943 after leaving Cleveland for Ft. Worth, I left my seat in the plane, went forward and sat down beside Barney, the pilot. Our horizon was wide at 10,000 feet. On the floor beside Barney was a copy of a newspaper. Pointing to it, he said, "Mr. Girdler, how do you think it's going to come out?"

I didn't know whether he referred to the Solomon Islands, the Russian front, or the Beveridge Plan. I asked.

"Oh," he said, "Little Orphan Annie! Do you think Daddy Warbucks is coming home in time?"

Many more people, I fear, are worrying about Little Orphan Annie than are worrying about the things that give me great concern. I am not worried about the outcome of the war, but I am genuinely frightened at times because of the likelihood that this country will not again be so able to fight off its enemies.

We are fighting them off this time, with weapons produced by industrial power that unquestionably is as great as it is because in the past the right to work was relatively unimpaired. That right is dangerously impaired today.

When we reach the end of the war, this country will confront a problem almost as big as preparing for war. If there were the same desire *in* government as there is *out* of it to enable capitalism to meet this test there could be more intelligent planning for the emergency ahead in every county in the country. Even with the best of planning there is certain to be at least temporary unemployment of dismaying proportions.

Yet if we are to avoid dictatorship, jobs ought to be made for at least 55,000,000 workers, and at such a rate as to inspire people with confidence that the conversion to peacetime work will occur with a minimum of delay. This conversion process is only the initial phase of the trial we shall then be facing.

I have complete sympathy for the feelings of those who hold that long periods of mass idleness are no longer tolerable in a civilized society. Unemployment is waste of human energy, useful materials, capital and lives. As an industrial executive I loathe waste. From that same viewpoint, I can see how employment might be made on a scale equal to that which now exists, even greater.

Countless opportunities are available for capital. Management is ready and anxious to make the most of them. But if industry is to function at full capacity after the war it will be necessary, as the postwar period begins, for the government to relax and relinquish its wartime emergency control as rapidly as good sense would suggest.

However, since the basic problem is work, something more is required. Men won't be interested in payrolls if these do not imply pay envelopes. What can industry put in pay envelopes if industrial enterprises are not allowed in wartime to build up sufficient reserves to meet the staggering cost of reconversion to peacetime production? The present whole-hog policy of the government can lead only to ruin for a considerable part of industry. The consequence of that policy will be hopeless unemployment for millions of workers.

As matters stand the aviation industry is positively menaced with collapse after the war. It had no fat when the war began, and it is being prevented from accumulating any fat. I have great faith in the aviation industry for the long future. If it were permitted the means to bridge the postwar conversion, obviously it could make a tremendous contribution to the peacetime economy.

WHAT the war did for the airplane industry in the United States was to create a volume demand that justified mass production tooling, forevermore making it possible to produce airplanes relatively as cheaply as automobiles. As a result of the expansion, the airplane industry is now several-fold larger than the automobile industry ever was, measured by value of output.

But just as capacity for volume production is a new strength, so over-expansion is the great weakness of our new industrial giant. Among aircraft manufacturers are some pessimists who believe that with the war's end there is certain to be utter and complete collapse of aircraft manufacture.

This may happen. You may say that, even so, the tooling and the plants remain. But I say that the nation is obliged by necessity to recognize that within five years we will be five years behind the times unless somehow we keep these organizations alive and functioning.

If we have learned anything at all from the dreadful experience of watching the Germans and Japanese bombing peaceful, helpless neighbors, knowing ourselves to be helpless to interfere, then we shall somehow keep alive the power we now have to prevent that from happening again.

The power is rooted in these aircraft manufacturing organizations.

This is an advance excerpt from *Bootstraps*, Tom Girdler's story of his life and work written in collaboration with Boyden Sparkes. It is to be published in September by Charles Scribner's Sons.

To get a more detailed statistical approach to the same problem Mr. Girdler outlines here, turn to Francis M. Callery's article on Page 20: — "Giving Aviation a Future." Comment from interested readers will be welcomed by both Messrs. Girdler and Callery, who may be addressed at the editorial offices of *Plane Talk*.

DOWN WITH SUBMARINES

Here are the facts in one of the most portentous developments in the war to date. Submarine warfare was Hitler's main reliance in defeating American strategy. If he could cut our lines to Europe, we were lost. For months, it looked as if he might succeed. Then came V.L.R.

British Combine

AMERICAN airpower is proving itself in a new way.

Said Winston Churchill in June: "There are so many U-Boats employed now that it is almost impossible not to run into one of these great fields or screens of U-Boats which are spread out. We took the measures which have thrown the very long range airpower—V.L.R., as it is called—effectively into the anti-U-Boat struggle".

The next day the AP sent this dispatch from London:

"The British Air Ministry disclosed today, that American-made Liberator bombers, with a range of at least 2,000 miles. were the airplanes used in the 'V.L.R.' operations, referred to by the Prime Minister."

That was the first public revelation of what may prove a basic turning point of the war. President Roosevelt called the entrance into Sicily "the beginning of the end." That beginning was largely made possible by getting supplies to our African and British bases on schedule. Ten million tons of shipping were sent to the Mediterranean in May, according to Captain Leland T. Lovette, director of Navy public relations. Only 2.2 per cent was lost. Losses declined still further in June and July, by August were approaching the vanishing point.

The Liberators that the British have credited with calling the turn are equipped with extra large fuel tanks to carry their depth charges great distances. Some operate from bases in the United States under the U. S. Anti-Submarine Command; others from bases of the British Coastal Command in Iceland and North Ireland.

The Liberator work has been to "close the gap." When it was found that the air plane could be made the submarine's worst enemy, many different kinds of planes were put on the job, both carrier-borne and land-based planes.

Success has come by a slow, steady process of pushing the U-Boats ever farther out to sea. At first subs were nearly everywhere. Then planes were used to force them beyond a 400-mile radius of the coasts. When long range Liberators were put to work the result was to force the subs still farther back from eastern and western shorelines while putting them under attack hundreds of miles out in the ocean. One Liberator attack, made by Squadron Leader D. E. Istead, was staged 1,100 miles from his base.

Combat crews trained on land-based targets must have further training for U-Boat warfare. To develop this, the Anti-Submarine Command of the AAF has

The U-Boat, bombed 20 minutes previously by Liberator overhead, is resurfacing, will be sunk.

British Combine

Liberator navigator back from submarine patrol, making report to British Intelligence Officer.

British Combine

Member of ground crew inspects de-icing system of Liberator tail fin, before sea patrol begins

British Combine

...the sea-going Liberator, its belly white ...camouflage against the sky. *Below,* sinking ...marine showing oil-slick after being bombed.

...lished a special training school. Types ...craft it has announced using, in addi... to Liberators, include the B-17, B-18, ...H, and the A-20 and A-29.

...successful has been the strategy that ...arly July the British could announce ...arrival of an entire convoy, safely ...ught through "powerful forces of U-...s" under what was described as "com... shore-to-shore air cover." Credited ... the feat, in addition to Liberators, was ...aircraft as Catalina, Hudson, Ventura, ...ordfish, Martlet, Sunderland, and Hali...

PATROLLING against submarines is, for ...e men involved, a dull and boring job. ...e long flights place the men under a ...avy strain. They spend 24 hours on duty ...thout a break, eat all meals aboard, must ...ep their eyes peeled constantly. Iron self-...cipline is essential, and every crew mem...r must be keyed to absolute efficiency.

...e number of submarines now being ...k is probably running greater than ...ords show. Unless a plane crew actually ...s a sub break up and sink, it is listed ...y as a "probable" or a "damage".

...e British tell of one Liberator crew ...ich could only report a damage, yet was ...ed almost sure evidence of a sinking. ...erating from a British base, this Liber... was patrolling far out over the Atlan... when it sighted a German sub on the ...face.

...e crew attacked it from a height of ...s than 100 feet, travelling fast. A depth ...rge was dropped, and apparently con...ted exactly in the right spot. The blast ...m the charge was so terrific that, though ...ing at high speed, the plane was blown ...0 feet straight up. The crew reported ...t debris from the U-Boat was hurled ...ll around the plane and partially crippled ...

...When the plane was thrown into the ...r, its controls were partly blown away. ...t could not go down, would only climb. ...e crew knew they were 800 miles from ...me and in a bad way.

...e men had doubts about getting back ...o base with their climbing plane. But ...e motors functioned perfectly and pulled them in. Everybody crowded into the nose, to hold it down as much as possible. When base was finally sighted, the plane was up to 14,000. It seemed a question of bailing out. But the crew all stayed in, and the pilot brought the ship down for a crash landing. There were some injuries, but nobody was killed. The plane was saved.

It was a happy ending; but the crew was unable to claim a kill for all their trouble. They had not actually seen the U-Boat blown up or sunk, even though pieces went flying by. They could only list it as a "probable".

There are many operations like this which are probably sure hits.

THEN there are some attacks which do a lot of good, but which are pretty certain not to have caused a kill.

A Liberator of the Coastal Command was patrolling 500 miles out over the Atlantic when it spotted a group of survivors from a merchant vessel. They were in life boats lashed together, to prevent drifting apart.

A sub was seen lurking nearby, clearly hoping the survivors would be bait to attract other ships for torpedoing. The plane's problem was to get the survivors picked up. It laid down a path of smoke floats from the drifting boats to a British sloop, making sure the sloop got there. Twice it went after the sub and forced it to crash dive. That was all that was necessary. The sloop picked up the survivors without incident, and landed them safely at a British port.

The U-Boat's problem is this: it must often come to the surface. A convoy may be steaming by at 15 knots through its area, for instance. The sub's best strategy is to get ahead of the convoy during the day, and lie in wait for the ships at night.

But under water, the sub's speed is not fast enough to do this, so it must surface. Again, subs must lie on the surface part of the time to replenish their air supply and for other purposes. It is while they are surfacing that planes most easily spot them.

Spotting with eyes is, of course, not the only way of detecting a submarine, as the Germans already know. A German naval expert, writing in *Das Reich,* recently admitted that the vaunted U-Boat had been at least temporarily outmatched, and attributed part of the defeat to new Allied "sound locaters" so sensitive they could even detect a submarine "when it was operating noiselessly".

The Battle of the Atlantic is not yet won. It won't be, so long as there is a German sub left. But the Liberators, coordinated with other forms of attack, are making it so hot for the U-Boat that our ship losses have dropped to a very bearable fraction. Our supplies — and our men — are going abroad in a steady stream.

The submarine may remain a nuisance. Our losses may temporarily rise again. But we know now — and the Germans know — it will not affect the outcome of the war.

IN THE WEST

← LIBERATOR CREW OVER ITALY

Brig. Gen. Uzal G. Ent, "Flying General" commanding 9th Bomber Command, studies maps with crew before taking off from Libyan airport for raid on Grottaglie, Italy.

Nazis fled, belly gunner climbs from his "boil" and re
Photographer had difficulty keeping out of way of gunn

Here waist gunners in oxygen masks fight off an attacking formation of ME-109's. (Below) With the Liberator now descended to lower level, the masks can be removed.

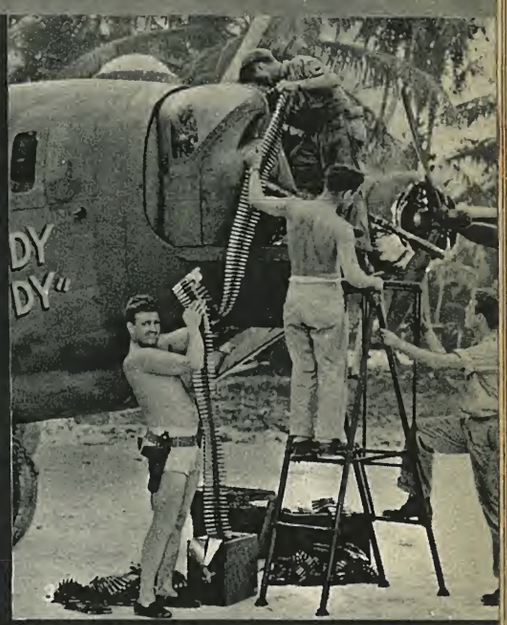
In the Pacific from Kiska to the Solomons Europe from the English Channel to the Medi ranean, the cracking Axis feels the crescend American airpower, hears the roar of Liberat Grouped here are some of the most telling p tures of America's air war to date—on this pa a Liberator crew under fire in a raid over It on the opposite page, a Liberator crew p paring for a raid on two Jap-held Pacific Islan

Brig. Gen. Uzal G. Ent, at right, riding as co-pilot, h pipe in teeth as Major John N. Lavin handles the contr

LIBERATOR RAID ON THE JAPS IN THE EAST

help in fusing and loading bombs for the to Nauru and Tarawa, north of Australia.

Liberator crews then loaded their own bombs. Here you see inside the ship, bomb coming up.



Here the Ready Teddy gets its nose turret loaded. Jap Zeros showed fear of these new power turrets.

crew cleans its guns for the Jap raid.
) Combat crews assembled for the briefing.

The vital motor check before the long flight.
(Below) Final pre-dawn check on day of raids.

Tractors move the Liberators to dispersal points.
(Below) Liberator bombs Jap ship in harbor.

CONQUES O

U. S. Navy Photographs

SEVERAL months ago Catalina patrol bombers were equipped with a new device.

Quietly, secretly, the Navy used it; no report was permitted at the time.

That device, announced to the public by Tom M. Girdler at the beginning of August, is destined to make practical the trans-polar travel for which bases have already been prepared — prepared at a cost in human effort that will not be fully known until the end of the war.*

It will make winter flying safe. It will remove from trans-Atlantic voyages one of the greatest of hazards. It will help us defeat the Japs in their far northern seas.

The invention which promises so much is a radically new thermal anti-icer for the leading edges of an airplane's wings and tail.

To understand its importance, the layman must realize that an airplane's lifting power comes from the shape of its wings. Ice forming on those wings is hazardous not mainly by reason of its added weight on the plane, but because it changes the shape of the airfoil.

Ice on wings has always been a hazard that airmen dreaded almost more than anything else. The present war has increased exposure to that hazard. For it has made it necessary to fly planes at great altitudes where intense cold prevails; to fly them in far northern regions; to fly them in the icy mists that overhang northern seas; and to fly them regardless of weather conditions.

In the middle 30's a de-icer was invented that was the best approach to the icing problem up to that time. It consisted of a giant rubber overshoe fitted over the leading edges of the wings and other parts, where ice interferes with the aerodynamics of the plane. By inflating and deflating the "overshoe" the ice was cracked after it was formed. Hence the name de-icer. But this ingenious device could be regarded only as a makeshift. It did not prevent the formation of ice. It did not overcome the loss in lift caused by irregular caking of ice.

The new thermal anti-icer is designed to prevent ice from forming at all. It will do this even in temperatures far below zero. Its principle is simple — a matter of heating the leading edges by the indirect use of formerly wasted exhaust gases.

Although its essence is simple, the practical application of this idea has taken six years of research and experiment. The idea was conceived and in part developed by the National Advisory Committee for Aeronautics; the detail work leading to perfection was done jointly by Consolidated Vultee engineers and Lewis A. Rodert, senior engineer of the NACA.

As now made practical, the thermal anti-icer uses the hot exhaust gases to heat air by means of heat exchangers in the engine exhaust pipes. The air is then circulated through wings and tail surfaces with controlled initial temperatures ranging as high as 350 degrees F.

This heated air keeps the aluminum alloy of the leading edges at a temperature of 60 degrees F. (28 degrees above freezing) even when the outside air temperature is 40 degrees below zero. Tests in far northern latitudes have now been completed, with the simple device functioning perfectly.

In the course of research, a Fairchild monoplane was secured by NACA six years ago, and preliminary tests were run at Langley Field, Virginia. Later, NACA made further tests on a Lockheed "12". Following this, a Consolidated Catalina was equipped with a direct radiating-type thermal anti-icing system, and tested by the Navy. Difficulties due to thermal expansion and overheating then led to the development of the circulating hot air system just now perfected.

Much of the work was done at the Ames Aeronautical Laboratories of the NACA at Moffett Field, California, under Engineer Rodert of NACA and Howard F. Schmidt, Consolidated Vultee Engineer. Additional work was done at San Diego.

* *See Dmitri's "Trip to Polaris," June* Plane Talk.

ESOVER ICE

U. S. Navy Photographs

Final flight tests, using the device installed on the Liberator and other aircraft, were conducted at Minneapolis under Rodert, with Schmidt and an Army crew making the flights in the Liberator.

As installed on the Liberator, the system is so arranged that the two outboard engines supply heated air to the leading edges of the outer wing panels. The air sweeps back through the interior of the wing and over the aileron, preventing the icing of the aileron controls.

The inboard engines supply heated air to the leading edge of the wing between inboard and outboard engines. Ducts from the inboard motors extend through the fuselage to the tail surfaces, performing the same function there. Other ducts carry heated air forward to the cabin and flight deck, where it defrosts the pilot's windshields and bombardier's window, and heats the cabin.

Practically the same system has been provided for the new P4Y-1, world's fastest two-engined flying boat which Consolidated Vultee is building at New Orleans for the Navy. Similarly, the Navy's Coronado (PB2Y-3), four-engined patrol bomber which is built at San Diego, is to be in production with the anti-icing system before the winter. An added feature of the installation in the Catalina and Coronado is the use of auxiliary heaters in the tails; this supplies greater heat, and prevents ice formation from splashing water during landings and takeoffs.

This is the story of a new invention, announced only this month, that will save countless lives — perhaps, some day, your own. In importance to aviation safety and progress it probably outranks any similar development.

Harry A. Sutton, Director of Engineering for Consolidated Vultee, has summarized the advantages of the new system as follows:

1. So long as the anti-icer is operating, ice never forms while the plane is in flight. Thus it cannot cake up, and destroy the plane's lift by changing the shape of the airfoil and breaking up the flow of air over the surface.

2. Since there is no loss of aerodynamic efficiency caused in either wing or tail surfaces by its installation, the anti-icer can be operated during combat, at slow flying speeds, and during take-offs and landings.

3. The new development entirely eliminates the hand labor previously necessary in cleaning off ice; until now, it has been necessary to clean accumulated frost from wing and tail surfaces and controls manually. This is a process often requiring several hours. With the anti-icer installed melting of the caked ice and frosts begins as soon as the engines are started up.

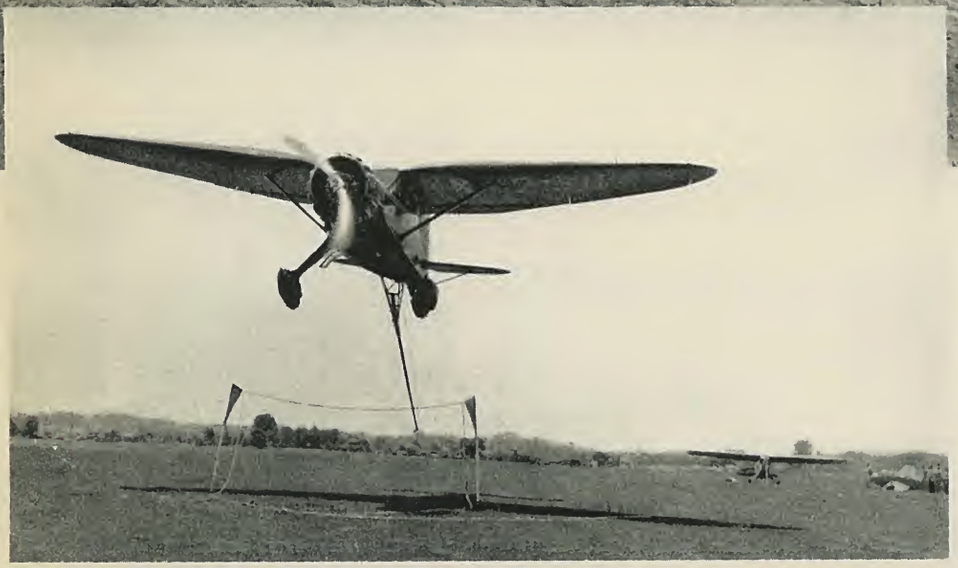
The development of the anti-icer serves almost literally, as poet Cyrano could have said, to dot the *i* in aviation, and show the way to its full meaning. America's air transport routes already girdle the earth. Everything that man could do to make air travel safe has been done — but the hazard of weather has always remained. Now we are on the way to conquering that last barrier to aviation's safe progress. And the words of Tom Girdler take on added significance for the multitude who like their travel, but want it with safety first:

"From now on the geography of the world has to be studied afresh in the light of this comparatively new power of humanity to go quickly wherever it wills. After the war one may travel from New York to Moscow by plane as quickly as today one can go from New York to Miami by train.

"There are already in existence mock-ups of gigantic airplanes that have convinced me, at least, that in the future only foolish men would dare build luxury liners such as the Normandie or Queen Mary. The luxury trade will take wings, and Buenos Aires will be closer to us than Paris used to be."

Small Planes Doing Big Jobs

Stinson Sentinel (Flying Jeep) hovering almost at eye level over a ground jeep, for which it can serve as scout and observer.



Pick-up test at Wright Field, using an old-model Stinson Reliant to pick up a training glider.

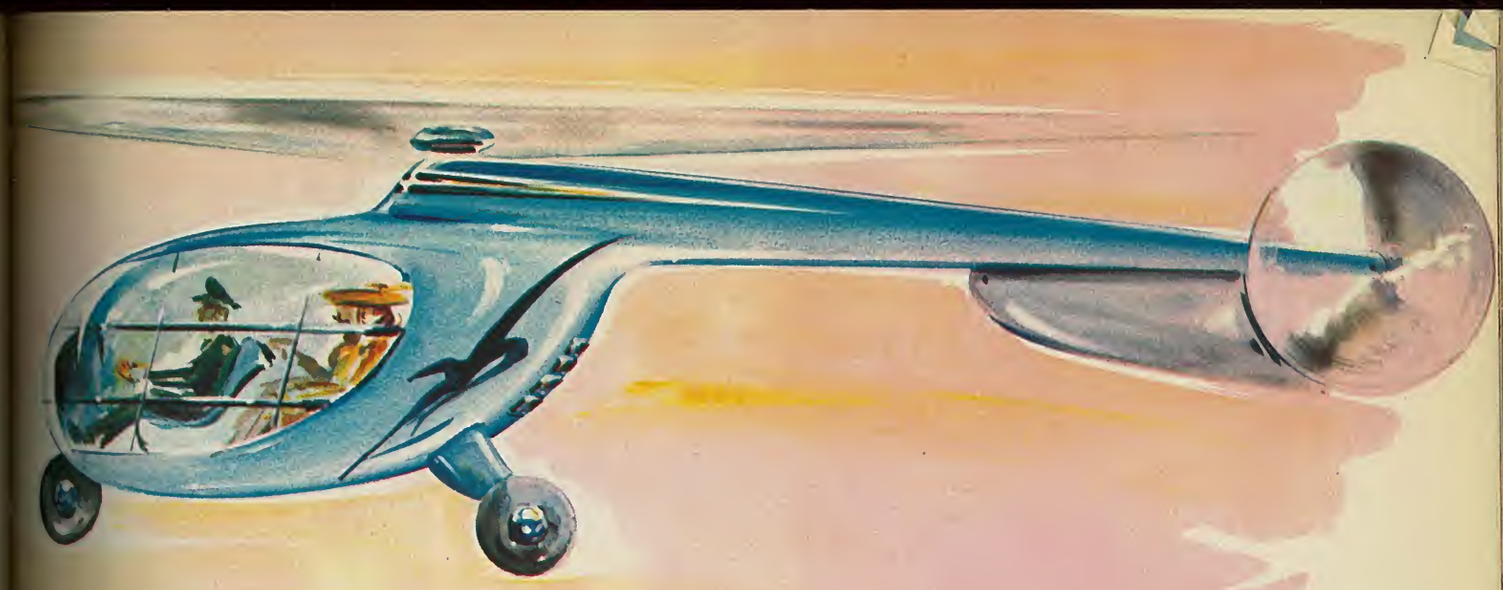
Here the hook has met the pick-up rope, at 100 m.p.h. The pick-up system for mail is similar.

IN the rush of current news regarding t development of big planes, it is not be forgotten that the small, lightwei plane is a vital part of American airpow

Thus the Stinson Jeep, already in u at the fronts, is doing a big job just beca it weighs so little (2100 pounds) — c take off from almost any terrain — and c even fly between trees with its 34-foot w span. You see it in the top picture hov ing over the American ground jeep, i liaison work where it acts as the eyes the ground troops.

While new-model Stinsons are going the army, older Stinson models have b converted for important uses at home — in the Civil Air Patrol, and in the pick system for air mail that is being opera by All American Aviation, Inc.

The air mail pick-up service was sta as an experiment in 1939, was placed o permanent basis a little over a year l by the Civil Aeronautics Board. It se small communities, by providing sh haul lines that link them with longer tr continental routes. By using small pl for the service, the post office is able operate it without loss, and even at a sm profit. A fleet of old-model Stinson Reli was converted for this pick-up operation



UP BILL STOUT'S SLEEVE

By Howard Stephenson

WHAT about your post-war airplane? W. B. Stout of Detroit has some pointed answers. Now head of Stout Research Division of Consolidated Vultee, he has called the turn for 20 years on new developments, one by one, with an accuracy as uncanny as a slide rule's.

With war manufacture engaging the entire time and effort of Consolidated Vultee management, Bill Stout has in his capable hands the job of assisting Consolidated Vultee executives to gauge trends, and prepare preliminary plans for future aviation development. The ideas expressed here are Stout's. Their execution must necessarily await the war's end.

Stout sees flying autos and trucks — planes that fold their wings on alighting, then run along highways on their four-wheel landing gear. He also sees helicopters of new design that fly straight up, forward, backward and sideways, landing on roofs, which he says afford more parking area than the streets.

Military uses and details of the new sky vehicles may not as yet be discussed, for security reasons. For ordinary civilian post-war use, however, Stout expects mass production of three different kinds of machines:

The Aerocar, or flying automobile for family tours and trips.

The Roadable airplane, for distance flights coupled with short trips on the ground.

The Helicab, a new type of helicopter, to enable commuters in large cities to cut travel from 40 minutes each way to 10.

"The aviation industry will have plants and trained personnel ready," Stout says, "to develop peacetime air and ground vehicles on an unprecedented scale. There should be very little time lag after the war ends.

"This can come to pass in a matter of months, provided the industry has been able to retain sufficient funds and resources to maintain development work, organize for the production job and establish marketing and sales organizations."

Present work is on a laboratory scale, but is advancing steadily. And the public, Stout is convinced, is ready for the planes and cars of the future. Half a million men now under arms will have the mechanical training necessary to man the maintenance end of the industry.

Your three-passenger family car which takes wing for week-end trips and vacation jaunts will weigh 1500 pounds, half as much as pre-war Ford coupe. It will have a standard 60-inch wheel tread, will do 60 to 70 miles on the highway, and will use about as much gas as your old car. Its tires will be standard. Its transparent body will enable you to see everything in sight, including the envious neighbors. Because engineering design, according to Stout, is more important than weight in providing easy riding, you'll have road comfort to make a Rolls-Royce jealous.

For a flying trip, you back the car into a nearby parking lot or garage, let down the combined wing and outrigger tail assembly and hook 'er on. The wing spread is 35 feet. A pusher prop is fastened at the rear of the body, in order that in the air you may get maximum vision. You taxi across the parking lot runway and take off, soaring over treetops, zooming across countryside at 100 miles an hour. At that speed in the air, you're using approximately the same amount of gas as at 60 miles on the ground. Your flying auto is the first plane equipped with a motor car arrangement of four wheels. Your cruising range is about 250 miles.

Remember, it will be designed to be a good auto first, an airplane second. But Bill Stout has another machine up his sleeve, which will be a good plane first, and an auto only second. The distinction is important.

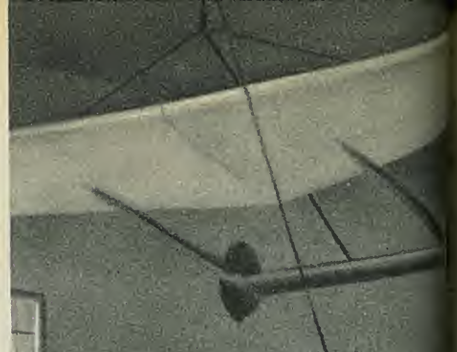
SUPPOSE, say, that you're living in the west where longer distances are to be covered. A light Roadable plane, weighing only 800 pounds, and with a 30-foot wingspread, will enable you to take 400-mile cross-country hops. If you're a businessman, you can use the plane as a light delivery truck. Stout points out that aviation design will have profound effects on materials of every sort, for the public is becoming

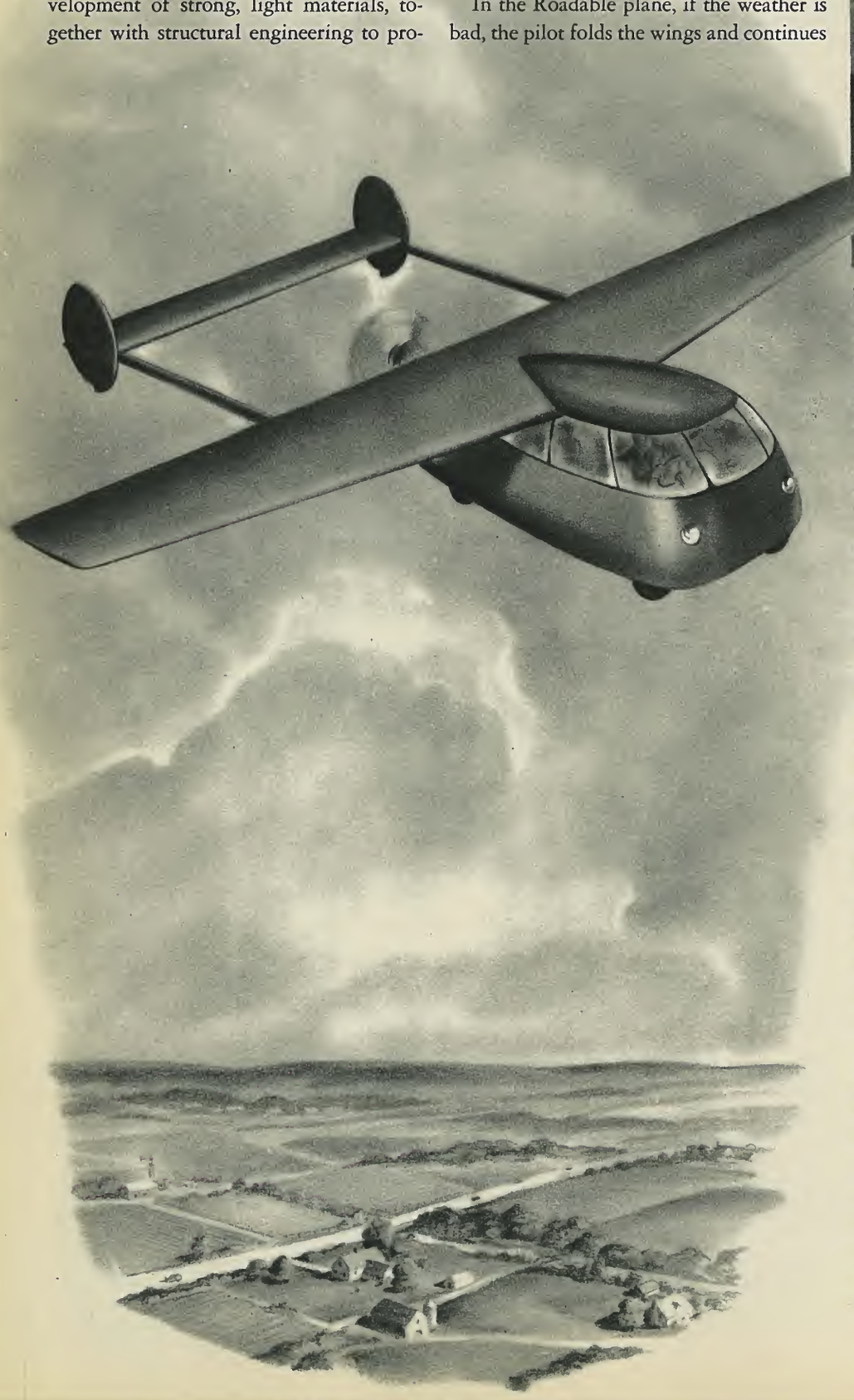
weight and space conscious. Lighter, tougher materials will be the rule. Folding furniture, for example, will be delivered by plane.

"Eighty-five per cent of all human activity consists in picking things up in one place and putting them down in another at the right time," Stout points out. "We're learning to make every burden lighter. Development of strong, light materials, together with structural engineering to provide maximum sturdiness — these are today's results of man's experience in the air."

The Roadable plane is primarily a sky vehicle, just as the Aerocar is primarily an automobile. Thus in your Roadable plane you'll do two miles a minute in the air, but only about 35 m.p.h. on land. When you land, you fold the wings to make road travel possible.

In the Roadable plane, if the weather is bad, the pilot folds the wings and continues on his way by road until the weather clears, or until he reaches a point beyond the storm or fog area.





The Aerocar (*left*) will be a good auto first, an airplane second, will be used mostly by city people in the west who want an auto weekdays, an airplane Sundays, says Stout. For a long trip in the air over weekends, you let down the combined wing and outrigger assembly (*above*) and — presto! — fly cross country at about 100 m.p.h.

In the case of the flyable motor car, the pilot just has to wait at the airport until the weather clears.

The flyable motor car was designed primarily as a motor car, and will be used mostly by city people in the west. They will probably drive it as an automobile during the week and then attach the wings on Saturday for weekend trips, etc. The Roadable plane, however, will be used primarily as an airplane with the ability to drive on the road (with the wings *folded*) as a secondary consideration. Neither of these vehicles will be used to any great extent in congested eastern cities — there the helicopter will provide the nearest possible thing to "personal" wings.

FOR the city dweller, creeping about congested streets, Stout's Helicab is designed to provide the nearest thing to personal wings yet devised. It is a sort of heavenly motorcycle, so versatile that in addition to moving in any wanted direction it will stand still in the air, hover at an aerial intersection for the sky cop's "Go" signal and need nothing bigger than a tennis court to land on.

Many companies now making war ... Stout predicts, will be in the heli... manufacturing business, and com... enterprise will lead to rapid and ... improvement. He sees half a ... helicopters alighting on New York ... rooftops and Los Angeles people ris... like homing birds each evening, to fly ... mountain retreats a few miles away ... a few thousand feet up.

The Helicab will be about 25 feet long ... 6 feet wide. It will stand 8 feet high. ... horizontal rotor on top of the plane will ... a spread of about 33 feet. The cabin, ... in design to accommodate from two ... five persons, will have a rounded plastic ..., resembling that of the Liberator, so ... pilot and passenger can see on all sides. ... fuselage, of tear-drop shape, is of light steel and duraluminum construction, sheathed with a new plastic about which Stout is not yet ready to talk.

The engine is of conventional design, but lighter, of 125 horsepower. A vertical steering propeller of six feet diameter is set alongside the tail. Its function is to correct the torque caused by rotation of the big horizontal propeller.

INCLUDING full load, two passengers, fuel and baggage, the Helicab will weigh about 1700 pounds. It will carry either airbag pontoons for landing in water, or fore and aft wheels for ground use.

The Helicab in flight can change direction rapidly and safely by tilting the 33-foot overhead propeller to the desired angle. Steps to simplify the method of changing the blade angle are among the important developments in design which Stout has accomplished.

"It is too early to talk about most of the mechanical details and changes in design on which the safe, lightweight, easy-to-operate and low-cost sky vehicles of post-war America will be based," Stout says, and adds:

"The industry is making steady progress. The aviation industry has gone ahead faster in this war than in a decade of past peacetime years. I see no reason why such things as electronic controls to prevent collision, constant communication from plane to plane and from plane to ground, and establishment of air lane levels for various types of aircraft, need be delayed when peacetime aviation comes."

The Helicab, nearest thing to personal wings yet devised, will land at suburban doorsteps and on city roofs, will be preferred in congested areas.

GENERAL WILLIAMS AND HIS LIBERATOR

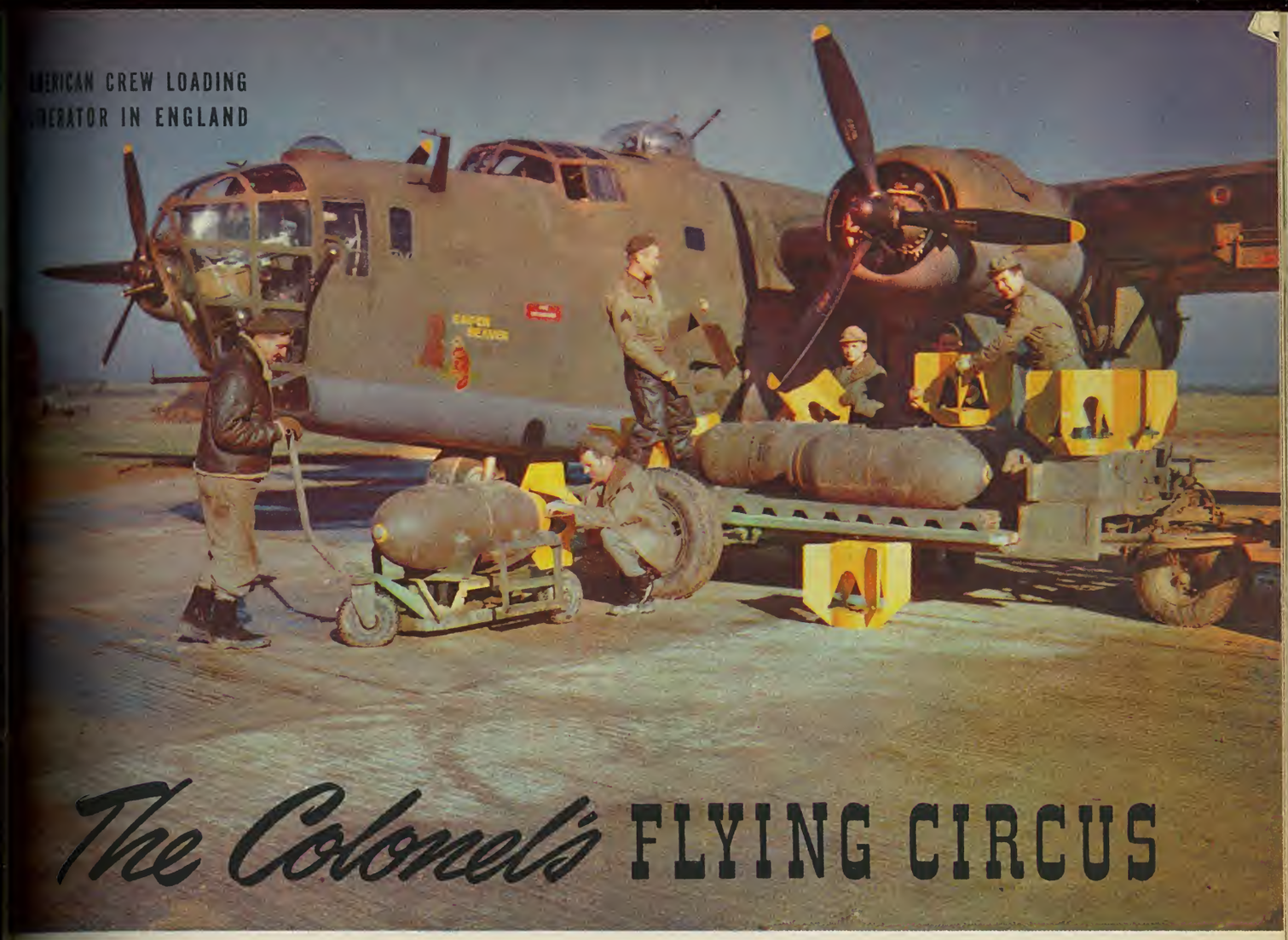
Meet Brigadier General Robert B. Williams, and his new bomber.

This picture was taken just shortly before General Williams was given an important new assignment.

The Brigadier General had previously been Commanding General, I Bomber Command, with headquarters at Biggs Field, El Paso, Texas. Just 41 years old, he is a native Texan, holds a degree in Civil Engineering from Texas A & M, and has been in the Air Corps since 1923.

General Williams' Liberator bea the designation 81-IV. His first fou engined bomber was the second B-1 to come from the Boeing productio line in 1927. His fourth personal a plane, a B-24, bears the same seri number, 81, and the Roman numer IV to indicate this is the fourth b bomber assigned to him.

Regarded as one of the top b bomber pilots in the Army, Gener Williams has well over 3,000 hours four-engined aircraft to his credit.



MERICAN CREW LOADING
BERATOR IN ENGLAND

The Colonel's FLYING CIRCUS

British Combine

An Interview with Col. Edward J. Timberlake, Jr.

By Mail from London

COLONEL Edward J. Timberlake, Jr. and his boys have been back from Africa for some time now, as various battered industrial communities in Germany and Occupied France can testify to their sorrow. But you can bet your fur-lined boots that the inhabitants of Southern Italy and Sicily were glad to see his B-24's go.

For Colonel Ted and his Traveling Circus have made life hard and dying easy for the foe in two theaters of war. In little over six months of operations these star performers and their high-flying Libs dropped more than two million pounds of high explosive on the enemy. Their losses amounted to seven planes, as against a bag of 39 shot down, 25 probables, and 58 damaged.

Col. Ted's group base, which occupies many square miles of flat English countryside, is run with a quiet efficiency. Air and ground personnel work together like a smooth machine to put the most planes over the target and drop the most bombs in the best places in the least time. But the focal points of all this activity — and don't you ever forget it, brother! — is a small corner office in the long, low, grimly camouflaged headquarters building. The floor is innocent of carpeting. Two chairs, an iron stove and a desk form the furnishings — those and a rack where Colonel Ted's files are stowed in battered gasoline

By Albert H. Newman
"Newsweek" War Correspondent

cans scavenged from the Libyan Desert during the group's campaign there.

In the corner stands a brand-new German Mauser from the same dead battlefield. The Colonel picks up the gun and works the action. "Bought it from a Wog (Egyptian native)," he says. "Damned good gun. I'm going to cut it down and shoot deer with it after the war's over."

IT was March 28, 1942, that Ted's traveling troupe was first formed — at Barksdale Field, Louisiana. "We had no bombardiers or navigators," recounts the Colonel. "Fifty per cent of our pilots had had six weeks' instruction in heavy bombers. The remainder had been out of advanced school two weeks to a month. We got our enlisted men at the end of April and the remainder of our officer strength in June.

"We were assigned Liberators at Barksdale. I was pleased; I already thought the B-24 was tops as a plane. It turned out to be so far different from anything we'd flown that we didn't plumb its possibilities for a couple of months. A Consolidated test pilot showed us some of the tricks . . .

"From Barksdale we went to Ft. Myers, Fla. It was hotter than hell there. And one thing showed up — these Liberators could be maintained under the worst possible conditions. Sand and heat didn't seem to hurt them a bit. We pulled about 180

British Combine

Some of Colonel Ted's boys as caught by a British photographer at their base in England.

patrol flights, sank one sub and possibly another. It was the Florida thunderstorm season and any doubts we may have had as to the strength of the Liberator's wing were dispelled then and there.

"At our staging area in New England we received all new planes and the boys were mighty proud of them. Then we took off for England in September. The first two squadrons flew over in formation, experiencing excellent weather. They landed at the destination within a spread of half an hour. The third squadron ran into instrument weather and separated. One plane was lost.

"Our first three weeks were spent learning RAF navigational methods and procedure, as well as brushing up on formation work. We had had a lot of swell individual training but hadn't had enough planes before to fly in big formations.

"THEIR first Lille raid broke the boys in right. It made them realize how tough things were. I was flying the Teggie Ann (Flagship of the group, named for the young daughter of Col. Keith K. Compton of St. Joseph, Mo.). We escaped without a scratch. But we lost one plane, from which we saw several chutes descend.

"After that we started working on the sub pens down in Biscay. And that's where we felt the airplane come into its own because we had all the range in the world and could sneak up on the target from any side. We got pretty good and worked together as a group. The boys realized that our salvation was really getting into that formation close. In eight or nine operations down there we didn't lose a single plane as a direct result of enemy action.

"Meanwhile one of our squadrons had been detached for coastal patrol work from the south of England to the coast of Spain. They were clearing the way for the North African invasion, though of course we didn't know it at the time.

"In early December we were ordered to Africa. Oran was the first stop. Two squadrons went down intact, flying formation all the way. The third came in individually on a short, poorly lighted runway in bad weather at an airport surrounded by hills. It was against one of those hills that we lost fourteen men and one ship — including Ox Johnson, the pilot, and Dick Scott, our group intelligence officer.

"Shortly after we arrived, it started to pour. In spite of rain and mud we pulled two missions there. The first had all the earmarks of a good one. But one flight making an extra bombing run over Bizerte got hit by a dozen Focke-Wulfs. And one plane was shot up pretty badly; its gas line was hit. But pilot Lieut. John Roche of Davenport, Iowa, managed to get back to Algiers, where all the engines went dead. So he had to make a dead-stick landing with a heavy four-engined plane — a feat previously thought almost impossible.

"I wouldn't try it myself, but Roche handled his Lib nicely and set her down okay. He would have got away with it on a good field. But there was a gully down the middle of this one which broke the nose wheel and so she nosed down and broke her back. Next day over Bizerte was better. The boys were attacked by fifteen Focke-Wulfs and they gave them their first experience of concentrated nose attacks. But our pilots flew tightly and as a result there was only one bullet hole through one vertical fin. This showed the boys better than my lectures that formation flying was the stuff, because the day before they had spread and got into some trouble.

"At 12:01 a.m. on the seventeenth of December we took off in moonlight for our new base south of Tobruk, and swapped the endless mud of Oran for the ever-lasting sand of the Libyan Desert. We were all on our own out there, and started immediately to bomb objectives as far as 920 airline miles away — most of the time by circuitous routes. That's when we really got down to business. First they put us on night missions to Tunis and Bizerte.

"Those results were fair. We hit the target area, but sacrificed some of our precision. So in the last few days of December we went back to daylight raiding. And from then to the 25th of January we put up twelve planes every other day in bombardments of Tunis, Sousse, Sfax, and Tripoli. Hardly one raid fell below the rating of good.

"Then they started letting us hit targets in Sicily and Italy. Our first time out on one of these we went with two other groups, which turned back because of weather. Our lead plane also had to turn because of engine trouble. But our deputy leader, Lieut. David S. Thayer of Houston, Texas, led them down through the clouds over the target. And then something happened to Thayer's oxygen supply and he passed out. The leadership devolved on his copilot, Lieut. Leland J. Rath of Almond, Wisc. Rath took them in on the bombing run. Both of those boys did a hell of a fine job that day, and I was mighty proud of them.

"Our first raid on Naples was a daylight. After that particular job an Italian communique came out admitting "most extensive damage." Then on Feb. 7 we

another near-perfect mission — over Messina. There were very few wasted bombs on that one. Capt. Potts led the first flight and Capt. Joe Tate of St. Augustine, Fla., the second, for which they won DFC's.

YOU must consider that our trips down there averaged many hours. We timed them so that the planes were back on the line at 11 p.m. There they were bombed and serviced immediately, checked lightly, and had their guns cleaned. Then off they'd go again the next day. Sometimes we'd fly hundreds of pounds heavier than I'd thought we'd ever dare fly. We had no trouble at all with the planes. And there were only three maintenance men for each of them. It wasn't until we got back here that any one of those ships had even thought of seeing the inside of a hangar.

"They shot us to Oran about the 25th of February and we ran into zero-zero there with no possibility of the fog blowing away, and no airport on the north coast open. That's when we sweat! I thought I could see twelve airplanes and crews from my mighty fine group written off right there. But a couple of transport pilots in a DC-3 saved the day. They had heard us on the radio, found us circling, and led us into Oran. The trip back from there was pretty easy. After we got back here, they gave us ten days to clean up ourselves and our airplanes, and we certainly needed it. It also gave the kids a week off.

"Then we got back into the swing of things with a few practice missions. The first real raid was the one that Capt. John Jerstad of Racine, Wis., led over Vegesack — which wasn't bad for the first time."

Colonel Edward J. Timberlake, Jr., shown in an old photograph taken when he was a Lieutenant, the only picture available of him in this country.

Here your correspondent is impelled to note that it was this raid, perhaps more than any other, which prompted Maj. Gen. Ira C. Eaker of the Eighth Air Force here to say that the experimental period of daylight bombing in this theater was over — that the planes and men that had pioneered it had proven themselves.

"That deal was the first," the Colonel added, "that started to pull our boys off combat — when they started hitting the number of missions and operational hours which medical authorities agree is all they should have at one dose."

Colonel Ted walked to a window and looked out moodily at the English landscape. It was a grey day and a high wind was ripping tiles off the buildings on the post and I knew damn well what Colonel Ted was thinking — that his group was breaking up, that new faces soon would replace the old familiar ones around the rough board tables of the combat mess, and that more things could happen in one short year than anybody would believe.

So I asked him what he thought of his boys now that they were prematurely old men from the standpoint of experience in air fighting.

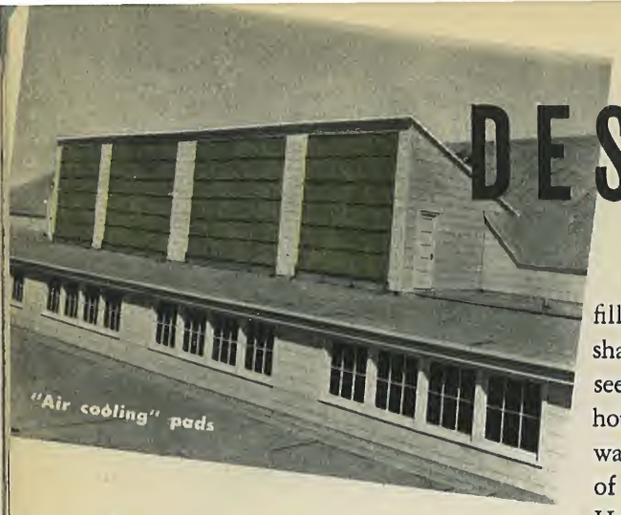
"They sure as hell have grown up a lot," said Colonel Ted. "They're a lot more serious about the whole thing than they were. They're awfully damned careful about taking care of their stuff. When you stop to consider that we were formed only a little over 365 days ago and that many have now filled up their operational time, you realize that it's a hell of a lot for a young kid. But I think they can fly an airplane a lot better than us old timers."

Then I asked him what he thought of the Liberator after living with her and flying her and fighting Junkers and Focke-Wulfs and Messerschmitts and Macchis with her for six months. "Personally," said Colonel Ted, weighing his words carefully, "I think it's the finest heavy bomber made anywhere in the world. It's one tough airplane. It's got a lot of heart in it. I'll take it over any other bomber for any kind of work. We need every one we get."

This picture of Colonel Ted's Circus, assembled on a Liberator, arrived in the United States uncaptioned — was evidently taken in England.

British Combine

DESERT VICTORY—IN RI



Because the Indians in our desert country knew how to keep their water cool, the Tucson plant of Consolidated Vultee is making production records this torrid summer. The problem was air conditioning, with no refrigeration equipment available. The great Fort Worth plant builds Liberators with the aid of one of the largest refrigerator systems in the world. When Tucson came along, ingenuity had to be used instead. The outcome might even give you an idea for your own home. The work of the Tucson Division has meanwhile progressed so well that its present hangar space and facilities are to be doubled.

OUT in the hot, dry, desert country of the Southwest, war workers are turning out four-engined Liberator bombers faster and faster this summer because the American Indian knew how to keep his water cool.

With a complete understanding of nature, he fashioned a porous earthen jar, filled it with water, and hung it in the shade of a mesquite tree. As the water seeped through the sides of the jar, the hot desert winds swept against it and the water was evaporated, chilling the sides of the jar and cooling the water it held. He called it an olla.

Today, in the Tucson, Arizona, plant of Consolidated Vultee Aircraft Corporation, each minute sees 1,024,000 cubic feet of air, cooled by the same principle, pouring into the huge plane hangars.

The Tucson installation is the largest of its kind in the world. It is also the simplest.

When U. S. Army and Consolidated Vultee engineers set out to design and build the plant at Tucson, where Liberators are modified for various war fronts, they had a heat problem.

From five to six months of the year the Tucson temperature hovers between 95 and 105 degrees Fahrenheit. The Indian, the Mexican, and in the old days the pioneer white man, took it easy from May to October. In the afternoons he closed his shop or store for three hours and took a siesta.

Obviously, a vital plane-producing plant couldn't shut down in such a manner. Men and women moving planes to the fighting fronts had to stay on the job.

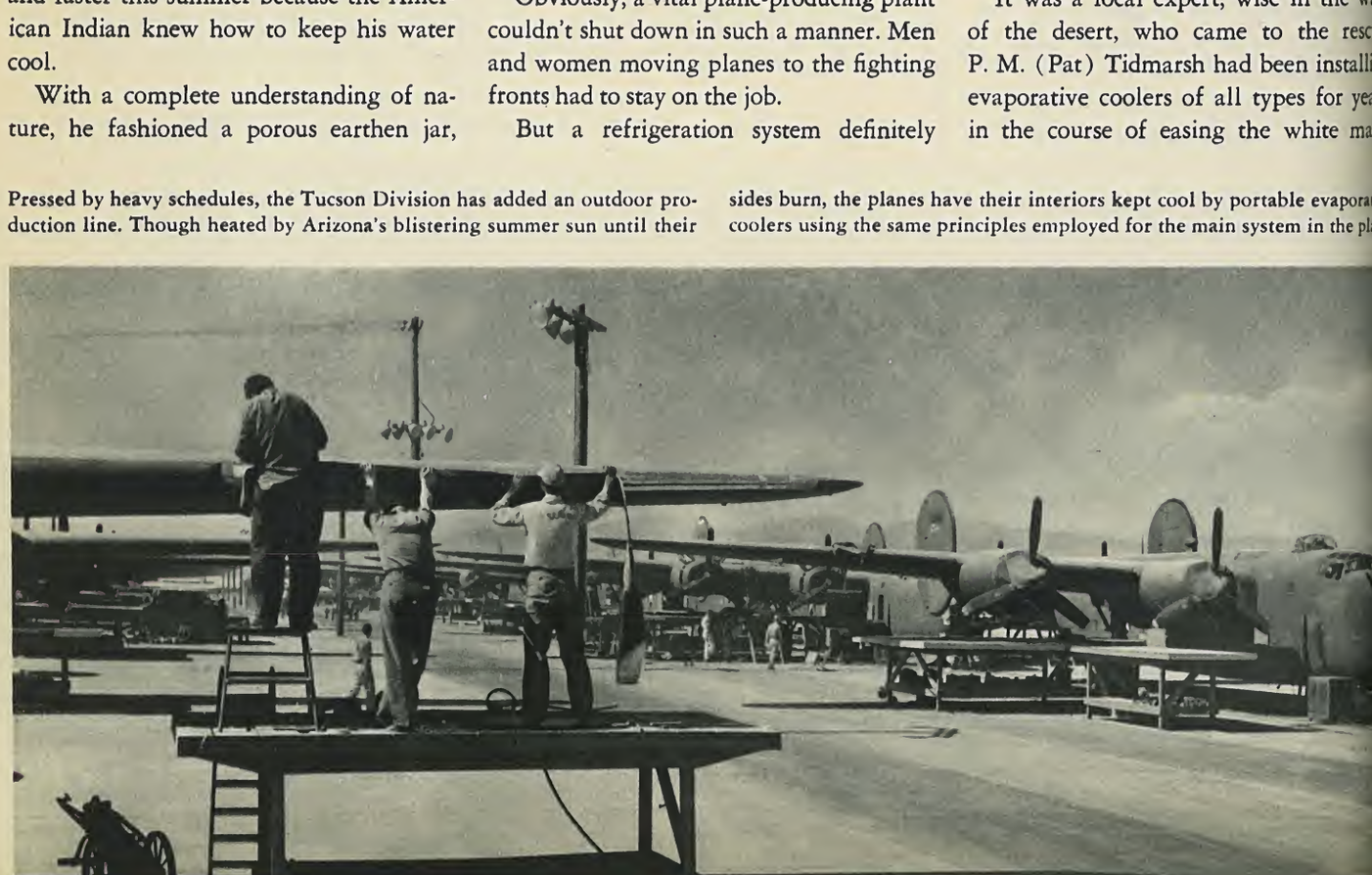
But a refrigeration system definitely could not be considered. Such equipment had long before been "frozen," and diverted to the synthetic rubber industry. Plant engineers turned, instead, to methods based on an evaporative principle for water cooling which has been evolved in the southwest.

The first of these methods was that known as the "air wash principle," which involves spraying fine jets of water through streams of air. Another was "natural principle" cooling, a method whereby water is cooled in a tower, and is then circulated through a bank of coils over which quantities of outside air are passed; the cooled air is then led into the space to be "conditioned".

BOTH methods proved unsatisfactory. The nozzles of the air washers became plugged; the coils of the radiators became "limed" in the same manner that an automobile radiator sometimes clogs up. Liming has always been a bugaboo in air cooling in the Southwest. This is due to two causes — dust in the air, and hardness in the water.

It was a local expert, wise in the ways of the desert, who came to the rescue. P. M. (Pat) Tidmarsh had been installing evaporative coolers of all types for years in the course of easing the white man's

Pressed by heavy schedules, the Tucson Division has added an outdoor production line. Though heated by Arizona's blistering summer sun until their sides burn, the planes have their interiors kept cool by portable evaporative coolers using the same principles employed for the main system in the plant.



IN RIZONA

The Indian "olla," used for water cooling, gave the white man a practical idea for cooling air.

burden in the Arizona clime. He recommended the use of what he called the evaporative cooling pad.

To prove his point, he led Consolidated Vultee engineers to a local ten-story hotel cooled by the evaporative pad system. The hotel's engineers had abandoned coils and cooling tower, and installed large excelsior pads through which water was slowly dripped from pipe installations at the top. The simple pad proved just as efficient as more elaborate installations, and much less trouble to maintain. Almost every private home in Tucson had used the very same method for years. But it had never been considered practical for large buildings. The hotel proved otherwise. It was decided to make a similar installation at the Consolidated Vultee plant.

THAT is the essence of the system Consolidated Vultee adopted. On the sides of the hangar roofs at Tucson you will see sheds erected, looking much like large dormer windows. What might be the window side is a mammoth pad of excelsior, held in place by heavy net-type wire. For the entire plant eight of these penthouse sheds were built. They provide a total cooling pad area of 5,712 square feet.

Over the top of the large excelsior pads run half-inch galvanized pipe, perforated at regular intervals to let a steady stream of water drip downward through the pads and keep them constantly moist. At the bottom of each pad a catch pan and pump is installed. The same water, considerably cooled after its first trip through the pad, is caught and returned to repeat its dripping over and over again.

Great blowers installed in the penthouse sheds suck a million cubic feet of dry Arizona air through the damp pads each minute. It is cooled in passing by evaporation, is then blown into the hangars where Liberators are being made ready for battle.

The same system is used to cool the interiors of Liberators where employees must work in close areas. Today the plant has a large part of its modification line right out under the sky.

Admittedly not as efficient in many respects as a refrigeration system, the evaporative pad is still efficient enough to be economically sound and to keep men cool. It can be used as a straight filter air blower system to give the offices and hangars a complete change of air every eight minutes, as well as a cooling system.

If you take a dip in a pool in Tucson in May, a drop of water clinging to your body will tend to cool to 65 degrees. This, allowing for an average May air temperature of 105 degrees, means a variation of 40 degrees. In July and August, when the temperature is around 95 degrees, that same drop of water, due to the higher humidity, will tend to cool to 72 degrees, a variation of only 23 degrees.

No one expects the evaporative cooler to do quite that well. But they are keeping the huge Liberator hangars at around 85 degrees while just outside the hangar doors it is 105 in the shade—with very little shade.

What's the job of a foreman — any foreman? Here's the answer of Howard Cannon, 28 years old, Foreman in Final assembly of Liberators at the San Diego plant of Consolidated Vultee.

At left you see him wearing the hat he always wears, whether at desk or machine.

PRODUCTION non-com

Told by Howard Cannon

A FOREMAN should be familiar with the personnel record of everyone in his employ. I am constantly looking over these records. Not long ago, my stenographer terminated. (That's plant lingo for saying she quit.) I had to have another. It occurred to me that I might find a feminine production worker who'd like to shed greasy clothing and resume a white collar career.

Yes, I found her. She had had considerable secretarial experience. In fact, she had headed the office of an insurance firm. She was working on the Liberator final assembly line as a riveter.

"How'd you like to push a pencil instead of a rivet gun?" I asked. "Why don't you wash your face and come up to my office?"

She looked at me for a long minute. Then she replied:

"My husband is a Marine officer. He flies a combat plane. If he has enough guts to fly one of those peashooters at 300 miles an hour, I've got enough guts to stay riveting on the production line. I'm here to build bombers — not push pencils."

I went back several times later, thinking she would change her mind. She didn't.

We foremen have two kinds of women working for us. Those who work because they want to work. And those who work because they want the paycheck. The first group is larger, thank God. Their minds and their hearts make up for their lack of muscle, and on some types of jobs they'll outwork any man. They work best if they have a husband or a sweetheart out there somewhere, ready to die. They know what war means. The second group doesn't count for much. They slow down, and then they quit.

I know all the people who work for me. There are about 100 men and 40 women. I know their home problems and their work problems. And the darndest things happen. For instance, there was that over-plump Mexican woman. She worked until 3:00 P.M. one day and had a baby at 11:00 A.M. the next. She was so stocky nobody noticed what was happening. That girl had something that makes you want to give your all and a little bit more.

Then there was the other girl who was going to have a baby. She was a riveter, sweating on the assembly line. I noticed what was happening to her. After the Mexican woman, I keep my eyes open.

"The doctor says I can work a couple of more months," she told me, the first time. She had the same story the second and the third time. Finally she came to me and said:

"I've got to quit. The doctor says I've got to quit."

And she started to cry. She cried as if her heart was broken. I think maybe it was.

A FOREMAN has to know about everybody who works for him for a lot of reasons. You take Joe, for instance. Joe was on final assembly for more than a year before he started to let down. Then he slipped badly. He dropped from the 80 per cent efficiency, which we find acceptable, down and down, and down. He didn't know what was the matter. Neither did I. I checked his personnel record and found he'd spent 15 years as a mechanic with a large typewriter company. I contacted the personnel department, recommended a transfer to the typewriter repair department. He got transferred. I saw him the other day. He was batting 120 per cent in efficiency.

"It's swell," he told me. "I sure like it. I wanted to help win the war. But I wasn't fitted to the job, that's all."

Another worker was slipping. I asked him why. He pointed to the small bomb release mechanism he was installing.

"I came in here to build bombers, and

want to do something important," he replied.

I told him to come outside with me. I led him inside a completed bomber.

"There is your bomb release mechanism," I told him. "If you don't install it absolutely accurately, one of those arms will hang up. Then the bomb won't fall outside the plane. It'll fall half inside and half outside. That's pretty important."

"I guess it is," he agreed. He went back to work. Today, he's one of my best men.

There was another fellow who stayed away now and then. He didn't offer plausible excuses. One day I noticed a clipping in a newspaper. General MacArthur was quoted as saying that if he only had a few more bombers he'd not only stop the Japs but move them back. I cut out the clipping and gave it to him.

"You don't build bombers by staying away from work," I told him. "I have to put another man on your job who can't do it as well. He doesn't install as much as you do. And he has been taken off another job he should have been doing."

The fellow is out now to make a perfect attendance record.

A foreman is always talking to the men and women under him. They're pretty smart. Once you explain to them what they are doing and you tell them personally about the importance of their work, and what it means to the men out there on the fronts, they take hold. And, when you explain how much of a mess staying away from work will cause, they understand.

It is hard, now, to get workers. Often I get fellows who have handicaps, such as tumors, or the loss of one arm, or nervous afflictions, or even partial paralysis. I feel that we have a very elaborate medical department, which gives examinations, makes tests, and studies applicants. So, when a man with handicaps is sent to me I try to find a job for him. I have never had to dismiss a man from the company's employ for reason of physical disability. I say to myself:

"This man is okay for something. Everybody can do something. He doesn't fit here, but he'll fit somewhere. If he doesn't find a place he fits, he'll quit. And then he'll be lost to the war effort. Or he'll go to another company which is more patient and understanding, and he'll work there, and he'll be lost to us."

Everybody is writing about what this hero and that hero is doing to the Japs or to the Germans or to the Italians. Nobody writes about what war is doing to said heroes. I got a fellow who had been shot through the head by a 50-calibre machine gun bullet. He was forgetful, and his left side was partly paralyzed. I worked with him a long time, trying to get him to use his left arm.

We made a little progress together. But the going was too tough. He wanted to work, he wanted to build bombers. So I got him a transfer, and now he's doing all right where the work isn't so heavy. But he realizes that he's helping — that's what counts. Foremen have to look out for situations like that, too.

A FOREMAN has a lot of jobs these days. He has to know what is going on everywhere. That's because, when you are mass producing airplanes, everything has to be at the right place at the right time. If the parts aren't there, the lines starve. The foreman just used to boss his department and play king in his own little world, but now he's looking around at what the other fellow does. A foreman may be batting 100 per cent in his own department, but if he doesn't look over the wall, and cooperate with the other fellow, his overall average drops away down.

Another thing that a foreman has to watch out for is that fine line which has to be drawn between familiarity with the workers and over-familiarity, which breeds disrespect. We have a rule at Consolidated Vultee, established by C. W. "Chuck" Perelle, vice-president, that there is a definite line of authority. It works this way:

If a worker has a problem or a complaint, he takes it up with his leadman. If the leadman can't settle it, the leadman takes it to the assistant foreman. If that doesn't solve it, the assistant takes it up with his foreman. That not proving successful, it goes to the general foreman. But the worker doesn't go along with his problem or complaint. He keeps on working.

This is a great idea. If every worker ran to the general foreman, let us say, with each individual problem, the general foreman would be swamped. And — what would be worse — if workers started doing that, they'd all lose respect for their immediate superiors.

A foreman has to have respect. He can be friendly, but he has to be firm. He can be kindly, but he can't wear kid gloves. He can request that work be done, rather than bark or shout. But he doesn't say "please."

Foremen are the first-line representatives of top management. They are like the non-commissioned officers in the Army. They are out on the front line, and winning or losing a battle depends on them.

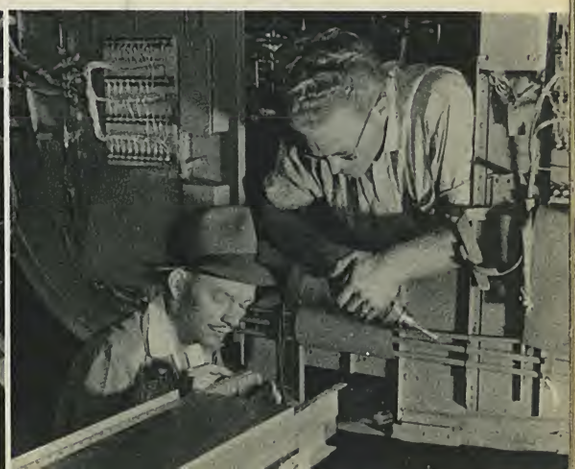
If you have a sloppy, careless, unpunctual foreman, you're going to have that kind of a worker, and you aren't going to make as many bombers. I don't mean you have to walk around looking like a dude, but they like to see you neat. They also like to know you can do their job. They like to see you work, and like to have you show them how to work. When I see a jam coming up, I roll up my sleeves and pitch in. I work with my gang and they work with me.

I get a kick out of my job because I realize that those who work with me depend on me. I like to think of myself as a Non-Com out there on the production line, helping to get the bombers out. I think that those who work under me know I feel that way. They know I want to get a job done, and they want to help me and the management I represent.

Yes, I like to build bombers, they like to build bombers, and that's why we get the job done.

"See, it goes just like this," he tells a worker.

Here he checks a "mating" operation in assembly.



GIVING AVIATION A *Future*

By Francis A. Callery

America, to remain a great air-power, needs a strong aviation industry. Francis A. Callery, Vice President in charge of Finance for Consolidated Vultee, tells of a weakness to remedy.

MUCH has been published to show the American people the magnificent things that aviation can do post-war.

Little has yet been said about the fact that these things cannot come to pass, unless a healthy aviation industry survives.

Hence a wide public understanding is needed for some of today's immediate problems facing the industry's management. And some questions should be answered. Is the aviation industry earning excessive war profits, for instance? Is it making its stockholders rich? Is it building up reserves for the days when it must readjust itself to a peace-time basis?

Here are some facts of present moment. First, stockholders of the aircraft companies have not profited from the war. In fact, they are not as well off now as they were a year or so before Pearl Harbor. This can be shown by some figures for six large airframe manufacturers — Boeing, Consolidated Vultee, Douglas, Lockheed, Martin, and North American.

In 1939 the average price of the shares of these six companies ranged between $41.70 high and $22.81 low. In 1940, the high was $42.97 and the low $25.72. In 1943, the range so far has been $29.97 high and $21.91 low. The present average price is approximately $24.90. It is clear that stockholders have not profited through any increased market value of shares.

Have they, then, profited through dividends?

Well, the average dividend of the six companies was $1.06 per share in 1939; $1.96 in 1940; $2.79 in 1941; and down to $1.96 again in 1942. Present dividend payments are no higher than in 1940. And, as shown above, there have been no market profits. Dividends and increase in values of stock are the only two ways by which stockholders can benefit. The aircraft stockholders have not benefited by either.

Nor, it may be remarked, have stockholders profited by the large investments made by government to expand aircraft manufacturing facilities. Consolidated earned $8,000,000, for instance, in 194[illegible] without such government facilities; [illegible] earned $9,000,000 in 1942 when using such government facilities as the new $22,000,000 parts plant at San Diego. The money the government has poured into aircraft has not gone to the stockholders at all.

IT can be pointed out, however, that reported earnings on the average have gone up during this period, from $1.83 per share in 1939 to $5.00 in 1940, to $9.[illegible] in 1941, and to $12.18 in 1942. This seems fantastic. It is. The profits as shown are merely bookkeeping figures. Stockholders do not get their hands on them. The profits do not represent undue enrichment of any one. Aircraft company stockholders and investors in general clearly do not consider these wartime "earnings" as real earnings. They are regarded as reserves—and highly inadequate reserves—for the transition period after the war.

The need of such reserves makes timely a few suggestions for changes in the renegotiation law which are necessary for the protection of the aircraft industry. The industry is not asking for rewards, nor do

think anyone is entitled to a reward for contribution to the war effort. It only asks to be left enough reserves out of the war to continue in business.

The question of reserves for post-war transition is perhaps the most important single problem now confronting the aircraft industry. The problem for the industry can be well illustrated by using the figures of Consolidated Aircraft.

Its business expanded from sales of $5,600,000 in 1939, to $9,300,000 in 1940, to $94,800,000 in eleven months of 1941, and to $304,000,000 for the year ending November 30, 1942. The sales of Consolidated Vultee Aircraft Corporation for the year to November 30, 1943 are estimated at over $650,000,000 — this company representing the merger of Consolidated and Vultee effected in March of 1943. The combined sales of the two companies for the 1942 fiscal year amounted to approximately $400,000,000.

Now the net working capital of Consolidated Vultee, after figuring suggested renegotiation settlements, amounted as of November 30, 1942, to approximately $9,000,000. This is only about 2.25 per cent of sales in 1942. It is less than 1.5 per cent of estimated sales for the current year. *This figure of $9,000,000 is the company's entire working capital. And it is just about equal to two weeks' payroll.*

On November 30, 1942, Consolidated alone had liabilities and commitments of $546,000,000. Against this it had cash, receivables and inventories, and Government supply contracts covering its commitments to subcontractors and suppliers. In addition, it had its working capital of $9,000,000.

It is easy to see that this meagre margin of capital to risk is a real problem.

If the company's officers were not devoting all their efforts to getting out more airplanes at the lowest possible cost, such a ratio would be enough to give them nightmares. The company's stockholders are literally risking every penny of their capital, up to the hilt, in the war effort.

The general belief is that they have been benefited by the immense volume of business which has been entrusted to the company. This is far from being the case. They, and the stockholders of all companies in the aircraft industry, would be far better off if their businesses had not been expanded to wartime's fantastic levels.

Even the most ardent aviation enthusiast cannot foresee anything but a shrinkage of business in the period immediately following the war.

Assuming its ability to survive the post-war transition, the aircraft industry would then need capital to develop peace-time products. The airplanes of today are not commercial types. Entirely new designs or major modifications of existing designs must be made.

It costs real money to build a new, big airplane. This money — "seed money", it has been called — must be available in the hands of the aircraft manufacturers if they are to continue in the business. For example, the prototype — that means the first airplane — of a 100-passenger transport would cost around $4,000,000. The tooling to go into quantity production would cost an additional $10,000,000.

It is not the intention of Congress or of the Price Adjustment Boards to take the aviation business away from those who have done so much to give us the best Air Force in the World, and then deliver it to the automobile companies or other companies left with adequate capital after the war. But this may well happen. It can only be prevented by leaving the aircraft companies with enough resources to continue in business.

Consolidated Vultee now has 90,000 employees, of whom about 40 per cent are women. It has no thought that any such force will be needed for post-war operations. But aircraft organizations can rightfully hope to keep at least their pre-war organizations together, and to continue applying toward aircraft development the engineering brains and skills that have made this country great in the air. This will require some changes in the renegotiation law.

Certainly the industry is not opposed to the objective of renegotiation in preventing excessive profits. But many of its executives do think that the law should be amended, and the regulations revised, as follows:

1. Renegotiation should be based on net profits after taxes. And net profits not exceeding 3 per cent on sales, or whatever rate the Committee might determine, should be exempt from renegotiation.

2. Provision should be made in the Revenue Bill to allow necessary reserves for the post-war transition. These reserves should be exempt from renegotiation. In the aircraft industry such reserves are desperately needed.

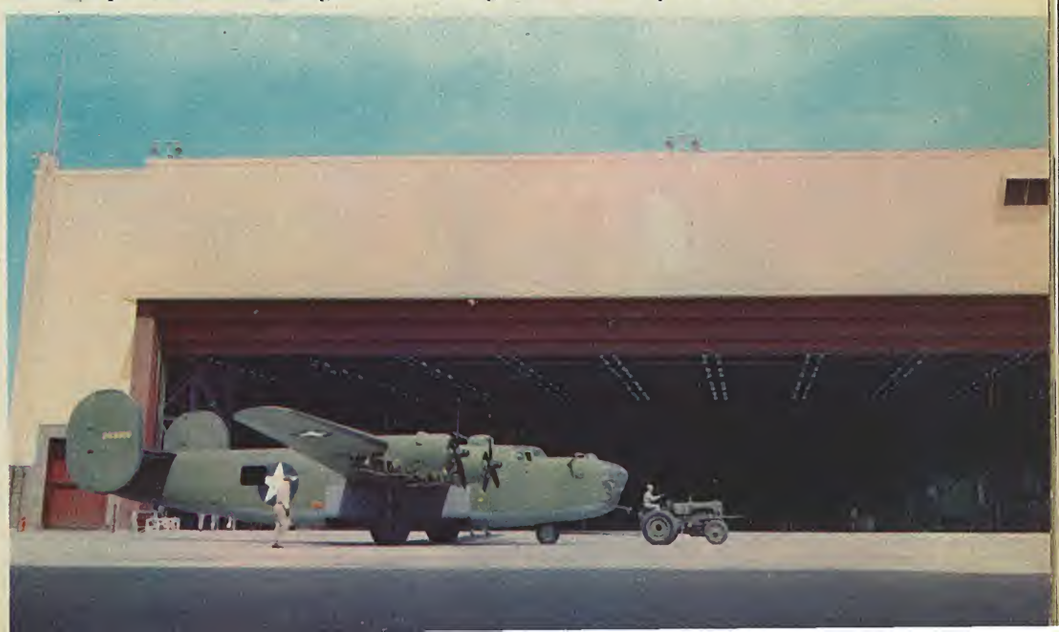
3. The provision for the termination of contracts should be changed to give adequate protection to contractors.

To comment briefly on these three points will help indicate why they are important.

PROFITS after taxes are the only real profits. Profits before taxes are stage money. Taxes are an unavoidable cost, no matter how you may reduce expenses by efficient operation of a business.

The law says that excessive profits are to be recaptured through renegotiation. The law does *not* say profits before taxes.

"The Aircraft companies are selling airplanes which they have created and sweat blood over . . ." The Liberator pictured below is being towed into the great Fort Worth plant for warfront modification.



"Consolidated Vultee now has 90,000 employees—and $9,000,000 is the company's entire working capital, just about equal to two weeks' payroll."

But the Price Adjustment Boards do their renegotiating *before* taxes, even though it would make just as much sense to compute profit before payrolls, or cost of raw materials, as to figure profit before taxes. How can a profit be identified as excessive until the profit itself is known? And how can a profit be determined until the taxes are known?

The thing that really ought to matter is what the United States Government pays for what it buys. The Government is at once the buyer and the tax collector. The taxes paid by a manufacturer, viewed from an overall cost standpoint, are actually a net reduction in the price the Government pays for his product.

To illustrate, let us assume that an identical type of airplane is sold to the Government by each of two manufacturers, at a price of $150,000. Let us also assume that this price of $150,000 is after all renegotiation adjustments, and that the Price Adjustment Board allows each company a profit of 10 per cent before taxes.

Let us further assume that one manufacturer is an aircraft company which designed, developed, and spent its own money on the airplane. This aircraft company has a small tax base, arising from low earnings and even losses in prior years, so its profits are taxed at the 80 per cent overall limitation.

The other manufacturer, an automobile company perhaps, would be building the plane to the aircraft company's designs and specifications, and would be benefiting by the know-how of the aircraft company. This manufacturer, we will say, has a more favorable tax base, arising from high earnings in former years, hence is taxed at an overall rate of only 50 per cent, compared with 80 per cent for the aircraft company.

Clearly, the profit before taxes for each company would be 10 per cent of $150,000 or $15,000. The aircraft company would pay a tax of 80 per cent, leaving 20 per cent, or $3,000 for its net profit. The other manufacturer would pay a tax of 50 per cent of the $15,000 profit, leaving it a net profit after taxes of $7,500.

Now, if the price is $150,000, and the profit before taxes $15,000, both manufacturers' cost for the airplane would be $135,000. But the net cost to the Government, (washing out taxes, an item going from one pocket to the other) would be the manufacturer's cost, plus the net profit he keeps *after* taxes.

In the case of the aircraft manufacturer, this net cost to the Government would be $135,000 plus $3,000, or $138,000. In the case of the other manufacturer, the cost to the Government would be $135,000 plus $7,500, or $142,500.

In this hypothetical case, which is probably paralleled throughout industry in general, the Government would be paying $4,500 more for the very same product from one manufacturer than from the other. And one company would be making $4,500 more profit in wartime for the same service. In effect, this is a subsidy serving to hold up the wartime earnings of companies that were profitable before the war.

THE aircraft companies are selling airplanes which they have created and sweat blood over. It is their only business. They have nothing to look to except airplanes after the war. Aircraft building is not a stop-gap business for them. Yet because of low tax bases, they end up with less profit than other companies which are just filling in on war work, and will have huge market demands for their own products after the war.

But in nine cases out of ten, the low profit company needs the additional profit much more urgently than the high profit company.

This is a fair picture of the unfair situation of the aircraft industry today.

It has been said that the job of renegotiating the thousands of war contracts could be materially reduced by exempting companies doing an annual renegotiable business of $500,000 or less. This would indeed screen out a large number of contractors, some making very high profits perhaps, and others small profits. But a fairer method of screening would be to exempt companies on the basis of profits made, rather than on the basis of the size of their business. The suggestion that prof-

of 3 per cent or under after taxes, or some other appropriate rate, be exempted from renegotiation would be an effective method of screening. Under this method, the companies exempted would not be making, by and large, inordinate profits out of the war.

When it comes further to termination of contracts, it should be noted that all of the industry's present contracts with both the Army and Navy can be cancelled at any time, if the Contracting Officer deems this to be the best interest of the Government. The present contracts in effect provide that expenditures up to the date of cancellation will be paid for, plus part of the profit. But a final determination under these provisions may well be a prolonged affair. And expenditures made by the contractor in all good faith might not be allowed in the settlement.

Assume even that all costs up to the date of cancellation are paid, the contracts still do not give any protection to the contractor against his real problem — that is, his operating expenses and losses after the termination date.

Our industry goes on the theory — and perhaps it is wishful thinking — that its expenditures for Government account up to today are covered if a cancellation notice should be sent out tonight. Tomorrow, however, is an entirely different matter. Its operating expenses could not possibly be cut off in time to prevent enormous losses.

In the case of Consolidated Vultee, its net working capital is less than two weeks' payroll. And payroll is only one element of expense. What would it do? A drastic cut off would create chaos in the communities in which it is doing business. And, while it could hope this method of termination will not be followed, such a possibility does exist under its contracts.

Termination provisions should undoubtedly be written so that they will give every such contractor some measure of protection against loss during the period following termination.

It is worth repeating that changes the industry needs are required not to protect its profits, but its future. That means the American future.

The accomplishments of Consolidated Aircraft in the matter of price reductions, for instance, clearly show that no undue profits are desired. Early in 1942, before the Renegotiation Law was discussed in Congress, it was decided by Consolidated's management that savings due to reduced costs, brought about by manufacturing efficiency, would probably be passed along to the Government in reduced prices.

In April before the Renegotiation Bill was introduced, Consolidated advised the contracting officers at Wright Field that it was planning to make certain voluntary reductions. In May, the price reductions were made. Further price reductions were made in July and again in September, with the net result that the Government for the fiscal year to November 30, 1942, benefited to the extent of $127,400,000. Of this amount, approximately $41,000,000 was refunded in cash and the balance through reduction in contract prices and waiver of escalator payments due.

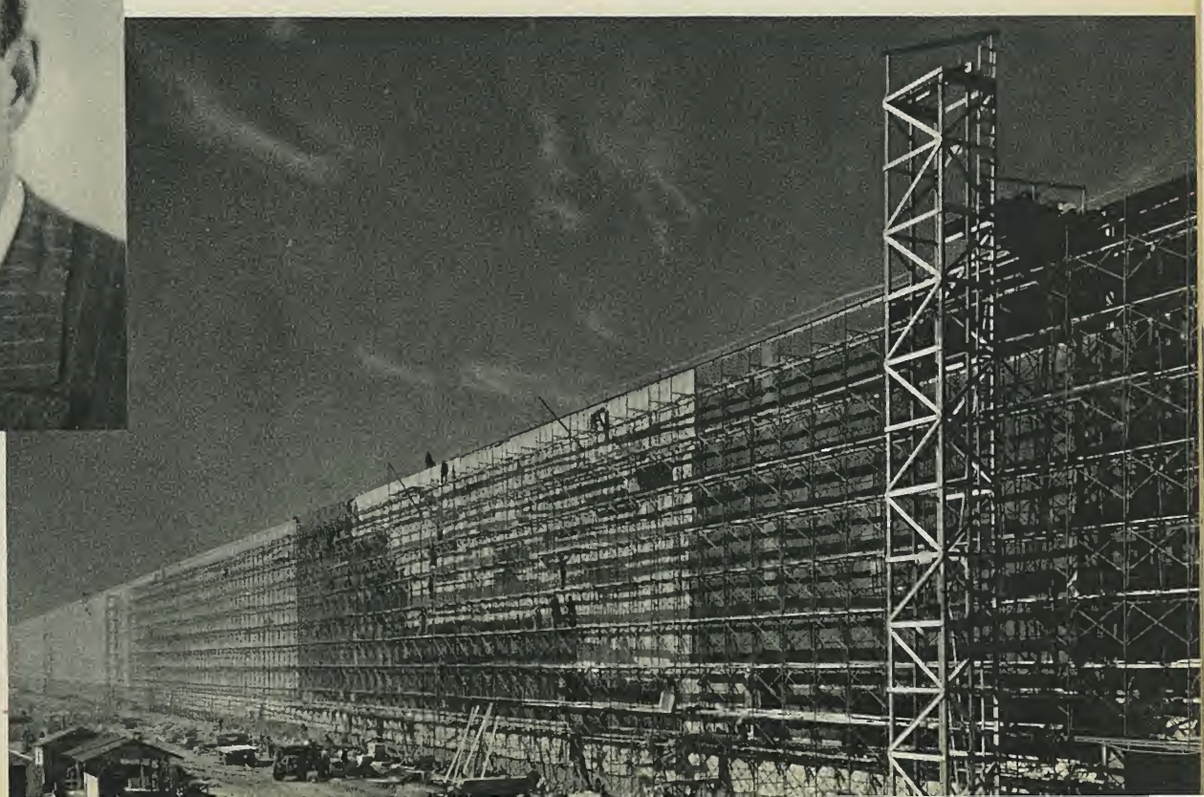
All of these returns to the Government were made voluntarily. That is proof of willingness to return savings made possible through manufacturing efficiency. In addition, in the proposed settlement with the Renegotiation Board, Consolidated is planning to return over $20,000,000 applicable to its 1942 business.

When present negotiations are completed, Consolidated Vultee will have an equity in its business of $18,000,000, speaking in round numbers. Of that, nine millions will be working capital, as previously stated; the other nine millions will represent investment in plant. Out of this $18,000,000 equity, the company plans to set aside $4,000,000 for a post-war reserve.

Consolidated Vultee, like the rest of the aviation industry, has played fair with the American people. In asking for a sensible renegotiation law, it trusts their understanding to protect the future of the industry that has made America's air power possible.

"Stockholders would be far better off if their business had not been expanded to wartime's fantastic levels."

Above, Francis A. Callery. *Right,* viewing the new Fort Worth plant, where Liberators are being made on one of the longest production lines in the United States.



Liberators 'round the clock

ENEMY LANDS — LIBERATOR TRANSPORTS — LIBERATOR BOMBINGS

Today the sun never sets on Liberators in war action. This map generalizes the routes shown over which Liberator express planes are now in daily use, since lines of exact routing would reveal information useful to the enemy. Bombing symbols indicate areas now under attack by Liberator bombers, not the relative concentration of the bombings.

The map is pole-centered, to show how most of the world's land area is concentrated north of the equator.

It further shows how geography is related to time, since each 15 degrees of longitude are equivalent to the passage of one hour. Using a map of this sort, you can readily figure that seven a.m. in New York means midday meal-time for our soldiers in North African bases, and is ten o'clock at night for our men in the Solomon Isles.

HOW CONSAIRWAY TRAINS NAVIGATORS

Chief Navigator Kerry Coughlin, of Consairway.

Since May, 1942, Consolidated Vultee management has operated a scheduled air transport line for the Army Transport Command. This is known as the Consairway Division of Consolidated Vultee Aircraft.

The navigator is a relatively new institution in air flight. Prior to the war, pilots working for companies engaged in overseas operations usually did their own navigating. Ships could be flown in cross-country jumps without much reference to navigation lore at all, thanks to radio beams and beacons.

Today the navigator — often called "Charts" by the crew — has become a specialist. There are various reasons: one is the new scope of America's long-distance flight operations. General H. L. George of the Air Transport Command, under which Consolidated Vultee is operating its Consairway Division, recently said the number of aircraft flown overseas by the ATC had jumped 1200 per cent in the last year.

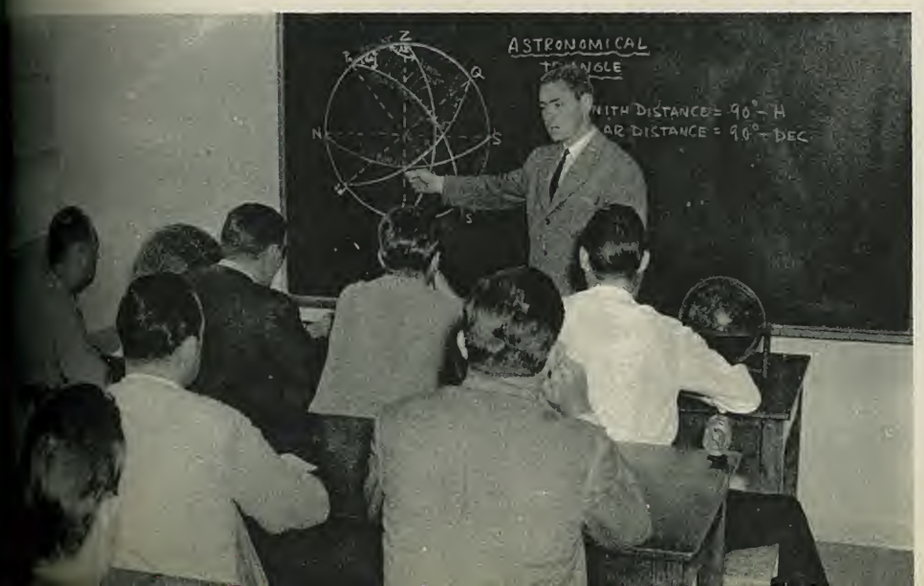
The navigator is still not a licensed specialist. Pilots, co-pilots, and flight engineers are licensed by the Civil Aeronautics Authority; radio operators are licensed by the Federal Communications Commission. But anybody — theoretically — can be a navigator, even though he must perform one of the most exacting, complicated jobs on a long-distance plane. This causes heart burnings among the qualified.

Kerry Coughlin, Chief Navigator for Consairway at San Diego, is enlisting supporters for a drive to require that all navigators must pass a uniform examination and hold a Federal license. That is bound to come. For the navigator's responsibility today is multiplied every time the range of our airplanes is increased.

At Consairway Division navigators chosen for training are selected because they can pass a strenuous test in dead reckoning and celestial navigation — equivalent to a second-class navigator's examination — and because they show exceptional ability to learn. They have gotten their preliminary navigation knowledge either through navigation schools, or practical experience in planes and surface vessels.

The prospective navigator for Consairway is put through a course where he first masters theory. The course stresses fundamentals, and places a high rating on men who can use their knowledge of the fundamentals to improvise in emergencies. If the student qualifies, he is then given actual experience in ocean navigation of Liberators.

It is an exacting course, but the principles are simple. Navigation is essentially the business of determining position and direction while travelling from point to point. There are four recognized methods of navigation for accomplishing this: Pilotage or Contact; Radio; Dead Reckoning; and Celestial.



IN pilotage, the pilot simply locates his position by recognizing definite landmarks he contacts, such as a highway, railroad, river, mountain.

Radio is almost as simple. It requires a radio set in functioning order, and is reliable in areas where directional beams, weather broadcasts, and reports of other possible hazards are available.

Dead Reckoning is the science of piloting aircraft from a point of departure to a pre-determined point of arrival, using certain instruments such as the drift indicator, altimeter, and chronometer.

Its essence is the truism that by keeping track of where he has been a navigator can be sure of where he is going. The detailed data of his flight fills a logbook; and he maintains a constant series of slide rule computations. From this data comes his estimated time of arrival of the plane at its correct destination; and a good navigator takes great pride in making estimates that are exactly fulfilled.

This all-important information is known to the trade as the E.T.A. Its calculation demands careful integration of time, air speed, direction, and drift. Except for the drift, Dead Reckoning (unlike Pilotage, Radio, or Celestial) demands no data from outside the plane. Hence it is the basic form of navigation. In bad weather it may be the only kind possible.

Celestial navigation is the science of determining position on the earth's surface by reference to celestial bodies such as the

sun, the moon, the planets, and the stars.

The navigator, for instance, can measure the altitude of the sun with a sextant, at the same instant noting the exact time. Then by using a nautical almanac and necessary table, he can compute and plot a line of position. Thereafter, he makes another observation of the sun an hour later, obtains a fix, and determines his exact position by simple triangulation. That is, he now determines the exact *point* where he is on the line he originally plotted. Note that this is done almost mechanically, by using instruments, tables, and simple mechanical drawing. Celestial navigation is as elementary as the fact that the sun rises in the east and sets in the west; that it moves south in the winter and north in the summertime.

The stars provide signposts for the world traveller that are almost equally simple to read for the initiated.

The navigator searches for the sub-stellar point — that point on earth which is directly beneath a star at any given moment. The sub-stellar points move as the stars move, parallel to the latitude lines around the earth.

For every instant of the day, the positions of the sun, moon and planets, and of 55 navigation stars, are listed in the almanacs relative to Greenwich, England. Thus their sub-stellar points can be readily located. The navigator, having done this, can now locate himself relative to Greenwich, and then plot his position on a chart.

SUCH is the basis of the theory taught in the Consairway navigation course. When the student seems to have mastered it, he is given a first class navigator's examination.

If he passes his examination, the student is ready for his first "check-out flight" — an overseas journey. All during this first trip his flight captain and other crew members — themselves conversant with navigation — will watch him, appraise him, measure his capabilities and his fitness for the job.

If he is self-conscious, he will find it a trying ordeal. Not only will he be checked on his performance, on the accuracy of his E.T.A., on his ability to know the exact position of the ship at all times. Also to be considered are his personality, his ability to get along well with the crew and inspire confidence, and his own feeling of confidence in his work.

Men know nothing more dreadful than the sense of being alone and lost in the wildernesses of the earth. Today's conquest of the air brings that primordial fear newly alive. It is the business of the navigator to destroy it, and put confidence in its place.

When a series of flights has shown him capable, he receives the nod.

"That's our objective — how do we get there?" is a question that puts on the navigator one of the heaviest responsibilities on a plane. When "Charts" goes to work for the Consairway Division, he knows how to answer it at the drop of a computer.

HOW THE NAVIGATOR OBTAINS A "FIX"

Figure 1: What the Navigator Must Understand At any instant of time, a given star (A) stands over a certain spot on the earth (A1), and (A1) is called its "sub-stellar point". If a navigator of a Liberator were observing at this sub-stellar point, he would see the star exactly overhead (zenith). And his octant would measure the altitude of that star as 90° above the horizon. Now if he were anywhere on the circumference of a circle 60 miles in radius about this sub-stellar point (A1), his octant would measure the altitude as 89°. Similarly, a 600 mile radius would give him an 80° altitude. And so on.

Thus one altitude reading puts the navigator on a "circle of position".

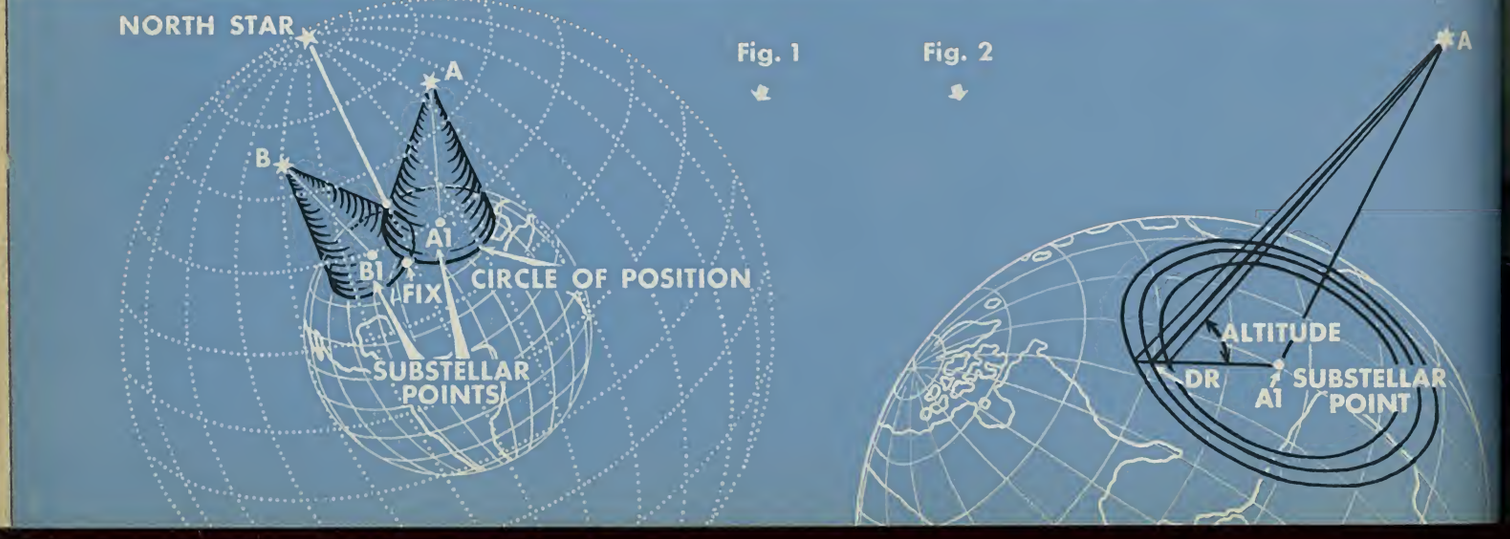
Now if he "sights" a second star (B) he can then find a second circle of position, centered on a second sub-stellar point (B1). Since he is on both these circles, he must be at *one* of their two intersections. His "dead reckoning" tells him which of the two is *it*. This gives him a "fix".

Such is the basic theory of making a "fix" — and a student navigator must understand this before he goes further. For various reasons — chart projections, scales, etc. — he proceeds differently in actual practice. (See the next column for the application of the theory.)

Figure 2: What the Navigator Really Does Here is a magnified section of the diagram to the left. It shows how the navigator actually proceeds. From his "dead reckoning" he believes his ship to have a certain position, in relation to a star (A) and its sub-stellar point (A1). This point of position is his "DR". It lies on a circle of position around the sub-stellar point (A1) that he can calculate by the aid of his Air Almanac and Hydrographic Office publication. By this means he can also calculate the star's altitude.

If he *is* there, an octant observation will give him a reading on the star that checks his calculated altitude. At the same time he calculates the direction of the sub-stellar point from his supposed position.

But if his observed altitude is *greater* than his calculated altitude, then he must be on a circle of position closer to the sub-stellar point; and for every minute of altitude angle difference, (intercept) he marks off one mile on his chart from his DR "toward" the sub-stellar point. Similarly if his observed altitude is *less* than his calculated altitude, he marks off one mile from the DR for each minute "away" from the sub-stellar point. In this way he concerns himself only with the region near the DR, and can use a large scale chart.



"Our Liberator is a Honey"

by Lieut. Henry D. Chism

WHEN *he started out, he didn't know ack-ack from shooting stars. Before he ended, he was a thrice-decorated hero and an experienced bombardier. Here is the story, in the matter-of-fact words of his diary, published by arrangement with the current* American Legion Magazine. *Lieutenant Chism is now back home, teaching other Liberator bombardiers what he learned.*

August 11

I am now 3,000 feet in the air, somewhere over Palestine headed for Egypt, where we will brief and load Li'l De-Icer with bombs. Don't know yet where we are going. Our Liberator is a honey and performs perfectly.

August 12

We went for Besa Matruh. We were at 15,000, cold as hell and black as pitch and there wasn't any moon. We couldn't find the target and the Germans were smart. They wouldn't light their searchlights and would stop their anti-aircraft fire when we got close. I didn't even know they were throwing shells at us; I did notice an unusual amount of shooting stars. When I got back this morning I was told that was ack-ack—Anti-Aircraft. Dropped five 1,000 pound bombs. No one in the flight saw the target.

August 15

Went on our second mission yesterday. Twelve Liberators on a daylight raid on Tobruk. We went in at 25,000 feet in elements of three, with ships for targets. We chose the largest ship and made a run on it. There was a lot of AA. The ship was burning when we left. Some 300 enemy pursuits are stationed in that area, but not one made a pass at our Liberators. I enjoyed it, much to my surprise. Thought I would be scared. But I was too busy.

August 21

We have been on alert for three days. It seems there is an enemy convoy which has holed up somewhere. The moment it moves out we will pounce on it. Li'l De-Icer, our Liberator, has had her belly full of bombs since Monday.

I bet I have lost twenty pounds. The mess is horrible. But now that the cooks have arrived — American — I think things will be better. We brief in 15 minutes.

August 23

One formation took off August 21 at 2:30, sighted the convoy at 5:59, reported it to the lead ship, which decided to look further. A few minutes' later we got the radio report, "I am being attacked." We sighted two ME-110's, then a B-24 came by under us with two motors on fire — dense white smoke pouring out. I could hear the tail guns firing, grabbed one of my guns and looked out the window, saw an ME hanging there well within range. Tried to swing on him but the gun wouldn't go that far. Looked for the 24 in trouble, saw him about 10,000 feet below, headed for land with an ME on his tail. The next time I looked he wasn't there — the gunners in the waist said he hit in the sea. And then we were seven.

We flew a course along the island of Crete, finally turned, started searching for

Below, Top: The painted figure that gave the Liberator its name. *Bottom*: Lieut. Paul Pestel, co-pilot of "Li'l De-Icer", with native admirers.

shows Chism's quarters at Liberator air base where he was stationed awhile in North Africa.

Chism sitting on one of the thousand-pound "eggs" awaiting loading by his ship, called "Li'l De-Icer".

Chism's crew being decorated by Maj. Gen. Brereton with Distinguished Flying Cross

the ships we'd passed over. Just three minutes before dark we sighted them, two warships, two merchant vessels. The attack started. Our element circled and watched while the others attacked, then it was our turn. We swept in at 14,000, began our run on a ship. Looking through the bombsight I could see the ship shooting at us. That is a funny feeling to watch the flak, tracers and fireballs leave the ship and come straight up at you.

The five bombs went away. I watched over the bombsight. There was a flash as the fifth found the target. We circled, turned for home. The mission covered 2,000 miles.

August 24

Yesterday we hit Tobruk the second time. This time it was a hell of a lot hotter. We got to the target just before dark. The target, a tanker, couldn't be found. So we made a run on the docks. My bombsight seemed acting up — my bombs went wide of the mark, striking in the midst of an AA battery of eight guns. (Hope I killed the lot.) I could see the AA guns shooting and the tracers coming up and one burst hit right between our Li'l De-Icer and the ship on our left wing, so close the whole crew was sweating. Later when I complained of the bombsight to the pilot he said he'd been dodging AA. Said he, "I was helping you. I was dodging." I couldn't help laughing. If there's one thing necessary on a run, it's holding the ship straight and level. That makes our 4th mission and 32½ hours of combat.

August 29

Our crew hit Tobruk for our third time last night, in our first night raid. Fifty ships hit the port. The British went in first with 4,000 pound bombs. We were 90 miles out when we started seeing the flashes as the two-tonners went off. Then we saw the fires start; about 30 miles out I saw a ship blown up in the harbor. As we were getting into position to make a run everything on the ground turned loose — searchlights playing and AA guns flashing and shells bursting — a very pretty exhibition. The ship before us must have hit a gas dump when it dropped a string — there was a flash and a mile square area burst into flame. We laid our eggs in the fire and left for home.

September 1

Tobruk again. There was a heavy haze and low clouds and the Germans guided us in with searchlights and AA fire. The AA was very good — one time there were four bursts on our level right in front of us. I held my breath — one more shot would have gotten us. It is getting so I know every little spot in the harbor.

September 8

They told us yesterday at briefing the objective was very important. Three large merchantmen with a screening force of 12 destroyers. We searched for them all afternoon — with three elements of three planes each in the search. About dusk one element cut out and started home. We were all short of gas and oxygen. It was getting dark. I looked over the lead element and saw the objective, so plain that at first I didn't believe it was ships. It was. We turned and started for it and just then the lead element turned and flew under us, headed for home. We tried to signal but they didn't get it. Then the ship on our right wing turned and left us, leaving just two Liberators. Together we made a nice long run of three minutes, found the target though it was getting dark. Bombs away!

They didn't even know we were up there till the bombs hit.

September 15

Suda Bay yesterday. Target was a tanker. Saw a convoy which looked like destroyers due to amount of wake. At 25,000 feet couldn't see the boats, just the wake. Un

...ded and dropped nine 500-pounders in ...un. Several ships were smoking when ...e left. I was expecting fighters but none ...ere sighted.

...ember 23

To Benghasi for the first time yester-..., and found a beautiful target. There ...ere seventeen ships in our formation. ...ght went in on the target in mass forma-... and dropped their bombs. Then three ...ments of three went in. The first made ... hit on the breakwater and on a ship ...ngside; the second, of which we were ...e lead ship, chose another ship and ...opped a stick causing a direct hit; the ...rd chose another ship and scored also. ...eryone was much pleased; we brought ...k photos to prove this. When we were ... miles from the target the tail gunner ...ported a huge explosion in the dock ...a; I went back in the tail carrying an ...ygen bottle and saw the smoke, from ...ght to ten thousand feet high. The Brit-... questioned us in a very polite way and ...t it be known they didn't believe an ex-...sion that far away could be seen. We ... a negative which proved our point.

...ber 4

We paid Navarino Bay in Greece a visit ...sterday. Went in at 18,000, and the AA ... plenty heavy. Three of the ships in ... four-ship element dropped our bombs ... the first run, but we had to make an-...her run for the lead ship. As we left the ...ores of Greece, an Italian and a Ger-... pursuit attacked our Liberator. We ...ere the fourth plane of the element, ...hich placed us in an exposed position. ...ur planes in front and over Li'l De-Icer ...ere all firing over us at the enemy. I ...ood in the astral dome and could see ... plane attacking us. Every time our ... gunner cut loose we could feel the ... shudder. Then, the tail gunner hit ... And the ME-109 hit the sea. The ...alian beat it for home.

We ran into some nasty weather over ... coastline going back and were lucky ... find the field. One ship in our element, ...loted by Kennedy, got lost in the dark, ...alled in to say they were low on gas. ...is morning we learned they had crashed ... a mountain side and burned. If they'd ...en 25 feet higher they'd have made it. ...e St. Jeans outfit got shot up and have ...ree men in the hospital.

October 7

At Suda Bay, with eight ships in two elements at 20,000 feet. AA burst around us; we heard eight distinct explosions. When you hear an AA explosion you're too damn close. The target was a ship along the jetty.

Leaving the target, we could see a pursuit flying fast off our right wing; we went under a cloud and lost him. When we landed we found that seven of our eight planes had holes in them from AA. One bombardier had a piece of shrapnel tear his leather jacket—the impact knocked him down. The gunner in another ship had a slug tear his flying suit at the knee. Ours was the only ship that didn't get hit. This makes 14 missions.

P.S. A piece of shrapnel was found in our ship the next day.

October 10

Benghasi at 24,500 feet — eight ships in four-ship elements. Leaving the target we encountered two ME-109's which stayed with us 45 minutes. Roe got in a lucky shot and hit one of them, though all of us had thought it out of range. He dropped end over end for 2,000 feet, then went spiraling down. When we got back we found five places where our ship was hit.

October 16

Benghasi at 25,000 feet. Approximately 30 planes. We went across land this time, ran into some really bad weather, had to climb through clouds in formation. I got a good scare. We broke into a clear spot just in time for a plane to cross beneath us fifty feet. That is too damn close for me. Slept on the way back.

October 28

We went after a 2500-ton tanker in the Bay at Navarino. Two elements of four each. The ship can be considered out of commission. On the way back we were attacked by two ME-109's. But they were afraid enough of us to stay their distance, which suited me fine.

November 10

Benghasi over the land route, at 21,000 feet. Eighteen ships. Ran into pursuit several times but ducked into clouds. Through the bombsight I could see the AA coming closer and closer. As the bombs went away, I straightened up and started to swing the sight out of the way, so I could watch the hits, when a piece of shrapnel came crashing through the nose at me sounding like a shotgun. It passed through part of the bombsight, threw glass and metal in my face. I thought it had gotten my eyes and had a bad moment. It did strike the connection of my ear phones not three inches from my neck and shattered it.

Where the bombs hit I don't know — I wasn't interested at the time.

November 21

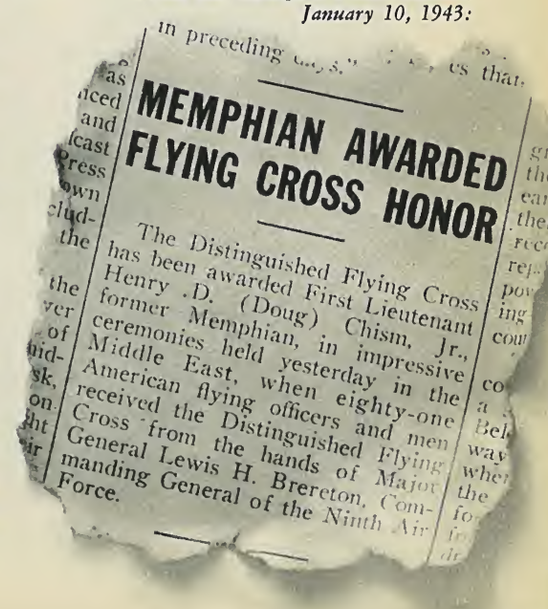
We flew to an advanced field near Tobruk on the 18th. The object was to bomb the Italian fleet if they tried to intercept the convoy to Malta. We stayed on the field three days, sleeping in the plane, eating rations with dust, breathing dust, and looking over the wrecked Nazi planes as we picked up souvenirs. Then we took off to bomb Tripoli, first time it had been bombed.

November 29

Tripoli. We were leading the group of 16 planes. Our bombs were the first to fall, and they hit the target dead center, sinking a ship and blowing the warehouses to hell. I didn't have a chance to see our bombs hit. As we went in a piece of AA passed through the nose and scattered glass over me. The AA was very accurate. Our ship was hit fourteen times and you could put your fist through some of the holes. They hit the gas lines of one of our motors and we had to feather it flying home on three motors.

Our best mission pulled off in the Middle East since the campaign started — for over a thousand miles. To date 243 hours combat time, 24 missions, and ready to quit.

From the Memphis Press-Scimitar, January 10, 1943:



in preceding ... us that ...

MEMPHIAN AWARDED FLYING CROSS HONOR

The Distinguished Flying Cross has been awarded First Lieutenant Henry D. (Doug) Chism, Jr., former Memphian, in impressive ceremonies held yesterday in the Middle East, when eighty-one American flying officers and men received the Distinguished Flying Cross from the hands of Major General Lewis H. Brereton, Commanding General of the Ninth Air Force.

TAKE-OFF FO

Pilot Clyde Rhodes

BY the time six weeks of training lay behind them the crew of the Apocalypse had become attached to their Liberator in the manner of all airmen, who end by regarding the plane they ride almost as part of themselves.

First phase of their training together made ten boys into a team. That done, they faced second and third training phases of even steadier work, tightening discipline, longer lessons, harder routine.

And once in awhile a break from rigid Air Corps strictness. Crews being groomed for combat get full 24-hour passes once a fortnight or oftener, and can proudly ignore the curfews that M.P.'s enforce on lesser men. If you accompanied the men of the Apocalypse on such a 24-hour pass, you would see most of them celebrating in the hot spots of the nearest town, in the way of soldiers immemorial.

You would find them building up new relationships to each other, in the course of such jamborees, just as useful as any they formed in training flights, and weaving still closer bonds.

It helps, when young fellows finally go together into battle, that these bonds are strong.

Watching this crew in training, you soon would note that some relationships in the service are not always obvious. Flight Officer Rhodes, for instance, was promoted to Second Lieutenant only when the crew went to Biggs Field, Texas, for the second and third phases of training.

But he already was superior officer over the Second Lieutenants on his crew. He had been appointed pilot and Flight Officer on merit, though without a commission at first. Further, as pilot of the Apocalypse, he outranks a superior officer riding in the plane when he is in charge.

On practice flight from Texas to Gulfport, Mississippi, which was made for the most part in oxygen masks at 20,000 feet, a First Lieutenant occupied the co-pilot's seat, acting as Group Bombardier Instructor. Rhodes told the Instructor that he wanted Co-Pilot Hartley to take over the Apocalypse controls.

"We're not flying this mission for th benefit of you or your co-pilot", the visito snapped. Rhodes quietly summoned Har ley to take over the controls. The shi landed. Second Lieutenant Rhodes steppe out. "Sir," he told the First Lieutenan "when the Apocalypse is in the air I a in command. I'm not going to have anyon tell me how to run my ship."

There was nothing that the senior Lieu tenant could say.

IN second and third phases, the crew ap proaches each day closer to actual com bat conditions. There are long night flights there are instrument flights, with the hoo on, there are long flights in formation which Rhodes has already mastered, bu must now teach his co-pilot.

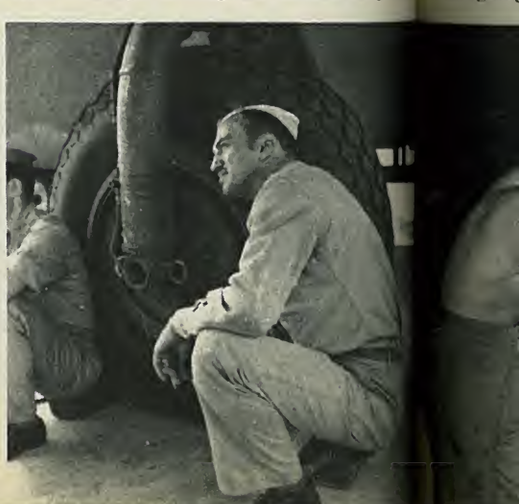
The first formation flight is a breath taking experience. The great Liberators fl wing-tip to wing-tip. Rhodes describes ho own crew's reactions to that event:

"The guys looked out the window wit their mouths open and eyes twice norma size. After today's flight, they will settl down like veterans — these boys catch o fast.

"We were the second ship off; we pulle up in formation, then I had Co-Pilot Har ley take over. He flew a very good forma tion. I was proud of him.

"Then, the Captain put me up to lea the formation; we had six ships. We flew 'V's' and 'step-up echelon'. If you think these Liberators won't handle, you don't know the Liberator. We stacked up in eche lon and then peeled those four-engine

Major Burleigh making his routine inspection



War

Great power is put in the hands of a Liberator crew. To handle it, they are given a rigorous training. Here is the training chronicle of the boys who called their ship Apocalypse. The Riders of the Apocalypse, according to St. John, had power to kill with sword and hunger and death.

bombers off like dive bombers. It is really fun, and it is beautiful."

Close discipline is important. Major Burleigh, in charge of the group that includes the Apocalypse crew, is a disciplinarian of the old school. When a staff sergeant once outdid all others in complaining about the mail room's delay, the Major broke him to private, to set an example.

As the combat crews in Major Burleigh's group approached the end of their third phase training, the Major decreed two hours of daily close order drill for them, for the rest of their stay in the States. His announced purpose was to discipline them for battle.

Rhodes, too, is a disciplinarian; he has learned at 24 to demand much of himself, before exacting it of his men. Once, when the Apocalypse crew had traveled to another base, its Liberator was damaged on the ground by a careless ground crew there. Rhodes ordered the Apocalypse crew itself to take turns standing a 24-hour guard so long as their ship was at that base. He and the other officers shared the watches with the enlisted men.

He is strict, but he feels with his men. He does not drink, for instance, or hit the high spots when pass day comes. But once, when he noticed his crew were still in the barracks after passes were issued, and he asked why, and learned they had money trouble, he and the officers made up a collection.

He expects his men's loyalty without qualification.

Once Castello, the radio operator, politely begged off from attending ground school, then spent most of the morning reading magazines and playing his Uke in the barracks. Lieutenant Rhodes walked in, silently surveyed the figure reclining on the bunk.

"Castello," said Rhodes, curtly, "You've violated the army's unwritten rule that you should never let your buddy down. Castello, you have let me down."

"Boy", the repentant Castello told one of the other fellows later, "I could hardly swallow."

As a crew becomes trained to a fine point, nerves get restless for action. You would sense that in the alert room. "Dear Mom," wrote one of the Apocalypse fellows from Biggs Field, "If you ever visited one of these alert rooms while crews were standing by you'd wonder where the hell the word 'alert' fits in.

"Flight I is standing by awaiting flying orders and still don't know if we'll go up or not. Since we've been here from early morning without too many hours of sleep, all sorts of forms are sprawled out everywhere. The long tables are the choice sleeping spots. The long benches get narrowly uncomfortable after awhile. The floor is better. Those of us who're awake keep scanning the room for a stray magazine. You can't be 'next' on a newspaper or mag, because there are ten guys ahead of you.

"We're not allowed to stray from the vicinity while on the alert, so we can't go to the P.X. (canteen). We've read the posters on the walls so often we know them by heart:

" 'Math meant little to Bombardier Futtle,
Altitude computation for him was too subtle
He soon found out that guessing won't do.
Jap thumbed his nose 'cause aim was untrue.'

"Lieutenant Rhodes keeps coming in and out of the alert room. He'll sit down and chat with us for awhile, pipe in hand, then go into the operations room. How he manages to look so fresh is beyond me."

Not all training flights are routine and uneventful. There was, for instance, the crew's trip to Blythe, California. The plane had just had a 100-hour inspection, but 20 minutes after the take-off an oil leak developed. Engine Number 3 spit flames. Rhodes instructed the crew to don parachutes for emergency. Then before they had to use them, he brought the ship in safely.

Another time, the crew was well aloft before discovering gasoline spraying from the right wing tank. Someone had been careless in servicing the ship. It was necessary to land again, tighten the tank caps sufficiently to make a good seal, and safety them. On such things do lives depend.

CLIMAX of the third phase of training for the Apocalypse crew was a three-day flight to Gulfport, Mississippi, with all the 12 ships of Squadron I. Rhodes was given the honor of piloting the lead ship in the first echelon. The boys took sandwiches and fruit for the long first day, and carried their best uniforms for the expected leave in Gulfport, and the 12 ships traveled strictly in formation the whole way.

"Our crew had one of the greatest thrills

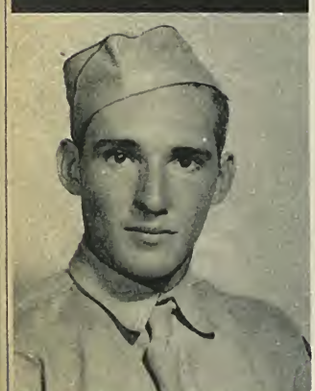
Weighing in the baggage for the take-off—each man was allowed a limit for the trip of 150 pounds.

Apocalypse Waist Gunners ready for action.

2nd Lt. Clyde E. Rhodes, Jr.
Pilot

2nd Lt. Pershing Bowes
Navigator

T/Sgt. Mike Castello
Radio Operator



S/Sgt. Claude Nixon
Ass't Radio Operator

S/Sgt. Raymond J. Kania
Tail Gunner

a crew can have as we got there," said one of the boys. "Every plane in the formation peeled off. Since we were last to peel off, we could see every ship ahead of us breaking away. This is one of the most beautiful sights in the world."

When this flight was satisfactorily concluded, the Apocalypse crew was given to understand they would soon be on their way into war.

In the tense days that followed, Major Burleigh often summoned all Squadron I to the Alert Room, giving final details of instruction on which their lives would depend.

Final leave came in June. All the boys had to sit up in chair cars for their eager trip. A few were fortunate, lived only a few hundred miles away. But two went all the way to New York. Tedone and Powers used the opportunity to marry their sweethearts. Kania found his Mae all eager for an understanding. Bowes missed seeing his fiancee on a stop-over, because he missed connections by just one hour.

They reported back, not in Texas, but in Topeka, Kansas, at noon on June 22nd. At Topeka Air Base, they picked up their Liberator for combat assignment.

There was no waiting around. Theirs was now deeply serious business. Every piece of the crew's equipment was itemized and checked; each man must have each item called for. An oxygen mask was fitted to each member of the crew by army doctors; importance of this was emphasized. Riggers adjusted every parachute with painstaking care. Each lad had his hair cut short to his head. Meanwhile the boys were all given final practice with the .30 caliber rifle, the carbine, the Thompson sub-machine gun, and the .45 caliber automatic pistol. Each will carry his pistol for the duration.

ON June 24th, the entire Burleigh group met in the Topeka Base War Theater, or war room. Doors were closed. A great map was placed before them. They were told what their final destination was going to be, and what route they would take.

This briefing lasted four hours. Men who had returned direct from fighting fronts gave them thoughtful advice. They were cautioned never to underestimate the abilities of the enemy. Experienced pilots, navigators, and radio operators described what would be expected of them on the long legs of the voyage into war.

Four days later, at noon, they took off from Topeka on the first leg of their great adventure. Each man was allowed 150 pounds of equipment. Engineer Ropinski supervised the distributing of the weight; loading the nose to lighten the tail; he warned that excessive tail load would cause the plane to "mush along" in flight, meaning the nose would ride high.

The hour came at last — the takeoff. Every member of the crew was summoned to the flight deck, to help equalize weight distribution.

Rhodes sped the plane down the full length of the runway. Doubts lingered that they'd clear, with their heavy load. But the climb began. The runway was cleared, if barely. The great plane with its enormous weight rose steadily, head into the wind.

And now Bowes, the navigator, became for a time the most important man aboard the ship. He had to find the way to Florida — and far beyond.

Castello tried out his radio equipment; it functioned perfectly. His assistant, Nixon, practiced getting into and out of the ball turret, his battle station. Powers, who at 19 had won the respect of all by his superb work as armorer gunner, scanned the sky over the shining waist guns. Engineers Ropinski and Tedone listened intently, trained ears alert to the whirring cadences of the vast machine. Kania tried his tail guns, and Lieutenant Smith made sure his bomb sight was all in order. Lieutenant Rhodes motioned to Co-Pilot Hartley to take over the controls. Then Clyde Rhodes walked aft, pipe in hand, and grinned with satisfaction at his crew.

That is the way you would have seen the boys take off for war, had you been there.

The great Liberator climbed steadily higher, despite its incredible load. The earth looked like a map, spread out far below.

2nd Lt. Carl B. H
Co-Pilot

2nd Lt. Carl A. S
Bombardier

T/Sgt. Roman R
Engineer

S/Sgt. Frank J. T
Ass't Engineer

S/Sgt. Walter J.

SHARING YOUR COPY

If you wish to share your copy of Plane Talk when you are through reading it, you may send it to a friend for 6¢. The simplest way of mailing is to slit a business-size envelope at both ends, roll up the magazine in it, seal and address and put on 6¢ in stamps.

This Soviet worker in Yakutsk, Siberia, lives only 28 hours' flying time from the Washington, D. C. airport.

It's 37 hours' flying time from Kansas City to this Chinese student's home, outside Chungking.

The office of this newspaper publisher in Calcutta, India, is 41 hours' flying time from Times Square, N. Y.

This Alaskan Eskimo lives near Fairbanks — 13 hours' flying time from the Chicago airport.

A 23-hour flight from Boston will put you in the office of this wholesale coffee dealer in Sao Paulo, Brazil.

The Pacific atoll where this Fiji Islander lives is only 34 hours' flying time from Denver.

No man on earth lives more than 60 hours from your local airport...

"A LOT OF THINGS are different in India than they are back home in Altoona," wrote a 19-year old sergeant in the U.S. Air Forces to his mother in Pennsylvania.

Never before in his life had this boy travelled beyond Pittsburgh — until he flew to India in a Liberator bomber.

To him — and hundreds of thousands of home-town American boys like him — India was a place "off there somewhere." He'd seen it in the newsreels and travelogue films. In his geography book he'd learned something about India's crops and minerals and untold riches, and the funny way the people dressed.

The world as it really is

Now his letters from overseas — telling how people talk and work and live in a strange land he never dreamed he'd see — *are penetrating into the lives and thinking of his family and friends in the town where he grew up.*

This is happening all over America today. And when our boys come home again — from India and China and Britain and Dutch Harbor and Australia and North Africa — they'll think of the world as they know it *really* is.

Not as isolated continents or separate hemispheres, but a clustering of nations whose *individual* welfare, in the peace to come, will depend upon the welfare of them *all.*

They know it can't be otherwise, when *no spot on earth is more than 60 hours' flying time from your local airport!*

In such a world, right now, we face the necessity of waging and winning a global war. Tomorrow — in a world shrunk still smaller because of even swifter long-range planes to come — we and all other nations must somehow contrive to get along together as neighbors.

CONSOLIDATED VULTEE AIRCRAFT

LIBERATOR (4-engine bomber) — CORONADO, CATALINA, (patrol bombers) — P4Y (anti-submarine plane) — LIBERATOR EXPRESS (transport) — VALIANT (basic trainer) — VENGEANCE (dive bomber) SENTINEL ("Flying Jeep") — RELIANT (navigational trainer)

From an advertisement of the Consolidated Vultee Aircraft Corporation

CONSOLIDATED VULTEE BASIC TRAINER

Plane Talk

NOVEMBER · 1943

...GET WITH BASIC TRAINER

Major George Fielding Eliot • Captain L. W. Pope, USN

Peter Masefield • Major George E. Haddaway, CAP

Plane Talk

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NOVEMBER, 1943 • CONTENTS • VOL. I, No. 4

PUBLISHED BY CONSOLIDATED VULTEE AIRCRAFT CORPORATION

Front Cover

Airforce Cadet with BT-15

In the basic trainers made by Consolidated Vultee for the Army and Navy, a very large proportion of America's air pilots have gotten their basic flying training. *(Coplan Kodachrome)*

Back Cover

Liberator Express Being Loaded

The Liberator Express (C-87) is one of the most widely used of the transport ships on ATC world routes. For some of the details of ATC's vast work, see "All Aboard for X".

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Editor's Note: The Apocalypse and its crew have now reached their station in a theatre of war, and further news about them will appear in an early issue.

Edited by Hill and Knowlton for the Consolidated Vultee Aircraft Corporation and published every other month. Text and pictures have been cleared for publication with Government authorities. Text may be reprinted with or without credit to Plane Talk. Copies of most pictures can be made available to editors upon request. While manuscripts are not solicited, first hand accounts of experiences by men in the air forces at the fronts will be given careful consideration. All correspondence should be addressed to the office of Hill and Knowlton, Room 3301, 350 Fifth Avenue, New York 1, New York.

Allowing no Respite

By Peter Masefield

Peter Masefield at the controls of a B-24.

When American airpower first appeared over Europe, numerous British experts were critical. One of these was Peter Masefield, distinguished aviation analyst, whose critique hurt keenly, just because of his outstanding position and world-wide audience. Now, however, Mr. Masefield has watched our long range heavy planes prove themselves for some two years in action; he has just completed a tour of the great American plants where they are built, and he generously writes here a mature judgement: "We in England did not realise the potentialities of American preciso-pattern bombing by day."

I SHALL never forget the first Liberator I saw, sitting in its now familiar pose on tricycle gear – tail cocked up, nose down as though deep in thought – on one of London's fighter defense airfields, newly arrived from America. In those days of stern defensive struggle there in England, this great new airplane brought a thrill of hope to everyone who saw it. For here was a positive indication of America's determination to give powerful aid in the War against Germany.

It had been hailed as an airplane with the makings of something really great. Now it began to show itself in action.

The first Liberators we received in England were some of those originally ordered by the French. They were fitted with French equipment which had to be replaced before they went into service. At that time the pressing need was for swift communication with the United States and Canada. Hence those early Liberators were set on the Atlantic run.

They were the only aircraft with sufficient range and load-carrying capacity to fly the Atlantic on regular schedules. And a magnificent job they did, carrying vital documents, official passengers travelling on state business, and hundreds of ferry-pilots returning to pick up the gradually increasing flow of American aircraft coming to Britain.

So well have these first Liberators served that some of them, including the very first, are still flying the same route. One became Mr. Churchill's famous "Com-

mando." Most of them are still referred to as LB-30 or LB-30As, a curious and interesting relic of the original French order. Apparently the order was made from Consolidated blue-prints of which the drawing numbers happened to be "LB-30." Taking this to be the name of the ship, the French ordered these new bombers under the title "LB-30." And so the number has remained ever since for these early versions of the machine.

THE Liberator was of course designed for long-range land bombing in daylight. But before it had a chance to prove itself in the job for which it had been conceived, it showed its versatility on other work. By the time that Liberators began to flow across the Atlantic in some numbers from San Diego, the Battle of the Atlantic against the German submarine had begun to take a serious turn. The urgent need was for long-range aircraft capable of standing patrol for hours at a time over convoys far from land, and of doing so while carrying a lethal load of depth charges. Already the Consolidated PBY "Catalina" boats had done well at the task. But much more was wanted if Great Britain was to be supplied with all the weapons essential for War, and the food needed to maintain the people and the great armies quartered in the islands.

The Liberator came to the rescue. Not only had it exceptional range; but it also had speed to carry it to its mid-Atlantic assignments in the minimum of time; it had the capacity to carry a killing load of depth charges; it had space for the crew to rest during long hours over the sea. And, as important as any of these things, it had space for the many radio and radar devices which led to the tracking down of the U-boats.

Thus the R.A.F. Coastal Command began to build up a fleet of Liberators which contributed more than any other aircraft to the winning of the Battle of the Atlantic. What this means is not easy to realize. The fact is that had the means not been available for keeping the German submarines at bay, the whole War might well have been lost on the waters of the Atlantic.

The reply of the submarine to long-range air attack was to surface and shoot back with an increased number of anti-aircraft guns. The reply of the Liberator to these tactics was the mounting of a "tray" containing four 20 mm. cannon under the belly. Numerous successes have been scored with this offensive armament. The result of all this was that the submarines moved out further into the Atlantic and concentrated their attacks in mid-ocean, where they believed they would be out of range of air interference. Again the Liberators came back with extra-long-range fuel tanks. And so the Very-Long-Range Liberator, the "V.L.R.," came into being, capable of sweeping the whole width of the Atlantic in one non-stop operation.

Meanwhile other Liberator bombers for the R.A.F. had been sent to the vital War front in Egypt, to help to stop another dangerous gap—the role of the Liberator has always seemed to be that of an assuager of desperate situations, thanks largely to its versatility. This time in Egypt, in Libya, in Tripolitania, in Tunisia and then in Sicily, the Liberator helped greatly in the rout of Rommel, the clearing of the Axis from Africa and in the final collapse of Italy.

BY now the United States was fully in the War, and Consolidated B-24s of the U.S. Army Air Forces, and Consolidated Liberators of the Royal Air Force, were flying together on missions against the common enemy. In England, the United States Army Eighth Air Force under General Ira C. Eaker received Liberator bombers, although the greater number still continued to flow to the Mediterranean area and to the Pacific fronts for the sake of standardization, particularly in maintenance and servicing.

Even so, the comparatively small numbers of Liberators with the Eighth Air Force have done magnificent work in daylight raids which dovetail completely with the great night bombing raids by the R.A.F. In the future—the near future—much larger numbers of Liberators are scheduled to be sent to England. Naturally they will be of the latest type now rolling out from the American plants in such numbers.

Having had the privilege, the pleasure and the encouragement of watching these newest Liberators with their greatly increased armament flowing from the factories at San Diego, Fort Worth, Dallas and Willow Run, I am convinced that they represent the most powerful combination of day-bombing qualities yet concentrated in any day bomber which has yet reached the stage of active service against the enemy.

Liberators of the earlier types in England had had their standard armament reinforced by guns in all sorts of surprising places. Now, in the new Liberators, the four power-operated twin-50 calibre turrets and the additional waist guns cover with precision every angle of attack. When flying in numbers in close formation, the new nose turret combines with the ball turret to insure that deeper penetrations than ever before can be made over enemy territory with lighter losses.

These facts, together with the Liberator's internal capacity for more than four tons of bombs at operation speed, together with its quantity production, should insure that its part in the future course of the War will be momentous.

At one time we in England did not realize the potentialities of American precision-pattern bombing by day, just as many people in America had not realized what could be achieved by night area-bombing as practiced by the R.A.F.

Now that we have had experience with each, in combination side-by-side, we realize that the two dovetail as though originally designed to go together, and that each is far more effective in its total achievements because of the other. The one requisite is a large and continuous scale of attack allowing no respite to the enemy. That is planned and that is now in progress.

Liberator Crew in England loading the "Katy Bug" for a raid on the Continent.

As Told by Cassie Giles

Riveting My Liberators

My number is 25-5399. Don's number is 0-563099. He wears his around his neck; Don's a Lieutenant in the Air Forces. Mine goes on a badge. I'm a number on the rivet line.

We got married when Don was 21 and I was 18, just before he went over. We'd known each other since we were kids in the seventh grade.

Probably nobody special ever heard of either of us. To the Generals who make their plans, Don's just another guy to have in the right place at the right time. And the fellows who plan Liberator production see me in the same way, if they ever note my presence at all.

"Good evening, Mr. Time Clock. Please tell Management that No. 25-5399 checked in promptly at 5 P.M."

Management, somewhere, will finally get the report, and doubtless feel vaguely gratified, in a nice impersonal way, to know that No. 25-5399 hauled itself out of bed again to keep a rivet gun riveting for another eight hours.

Now you'd think that was sort of boring, first off, and I did, too. Rivets and Rivets and Rivets. My God, there are three hundred thousand rivets in one Liberator. And where I work, I can look up and see Liberators stretching down the line and getting smaller and smaller until you can't see them any more — the line just disappears in the distance. Positively. I never knew, before this, that so much distance could be put under one roof.

You feel mighty small in all that scenery, sort of lost. The whole population of the town I grew up in was just around a thousand people. Here were tens of thousands rushing all around me, doing things I couldn't even imagine.

At one end of that plant all the stuff comes off freight cars, and the people keep doing things to it as it moves through the plant — and then, at the other end, it all just suddenly sails into the air and flies away. It's become Liberators.

You can't make much sense in telling about it — it sounds almost unbelievable, I mean — and when I started to work it didn't make sense to me when I saw it, either. I felt like one of those molecules you learn about in high school. You slowly push through the crowds and you finally line up in one particular crowd, and then you stand and you wait and you finally reach a desk, and then they note that you have gone to riveting school. And pretty soon some one says "This way, please." And soon you have a number and you start to riveting.

It was tough work at first. My fingers all seemed to be thumbs. I'd often almost rivet a finger instead of the rivet. And I'd wind up my shift weak and sore, and almost ready to drop. The work got me. The crowds got me. And that white-faced time clock got me. Every morning when I went to bed I wondered if I could pull myself out for another round.

And then one day — I don't know how it happened — I got an idea. Maybe it was because I was thinking about Don. I was wondering where he was, and if he had enough to eat, and was there a warm place for him to sleep of nights, and who would maybe mend his socks for him, and did it even matter. And I said a prayer about him, something like, "We aren't important, dear God, but we're so awfully important to each other. We've had such a little time together, and we're still young, and we need each other. Please keep him safe, and help us both. Amen."

It was something like that I said, just as any girl would. And then I looked up

and for a minute my eyes didn't take in clearly any of the people around; there was only that line of Liberators. And the thought came, like a flash, "Why, these are really *my* Liberators, mine and Don's. Why, all the other people here are just helping *me* keep Liberators on the move to where Don is."

OF course, it was a wholly crazy idea. Why, we are both nothing but country kids that went to school and Baptist Sunday School together and played games together, even kissing games, and it didn't mean a thing; and then . . . we got married, and it was the one thing that ever happened to me, outside the time when I was elected Football Queen in my Sophomore year at high school. I'm just another girl with good legs and sense enough to know it.

But as I put in my rivets, I began imagining that Management was working specially for me to keep my Liberators coming through on time, so I could put the rivets in. And I imagined that all the other workers were there to help me with the riveting, and do all the thousand other jobs my Liberators would need before they get flying on the way to help Don.

So when I punch the time clock nowadays I have a game. I just think, "Good Evening, Mr. Time Clock. Please instruct management that No. 25-5399 is on the job and wants materials kept moving to her without delay."

Since I've thought about the job in that way, I've really not been bored with riveting at all.

I used to think that a factory was a very rough place. But an aircraft factory isn't, at any rate. Out of the thousands of people that flow around you — and you're always just an island in thousands of people — you never get to know many. But you can tell them regardless. They're the salt of the earth kind of people.

There's that sad-eyed Czech girl, for instance, over in Control Surfaces. Her name is Frances Chumsky. On her left forefinger she has a callous the shape of a brazier head rivet. She works on center section trailing edges. They say she can do two trailing edges every shift. That means six thousand rivets a day, because it takes three thousand for one trailing edge. I'm not near that good yet.

There's one fellow on my shift who's a state legislator. You'd know it just from his name — Arthur Washington Cato. He told me there are six other legislators working at the plant, using their spare hours. There's also a mayor of a nearby village working on our shift; he drives up every day in an old grocery truck, bringing twelve other workers in with him.

There's also a minister, Mr. Pemberton, who works right beside me — he said there are several other ministers in the plant. And then there's Jessie Groves, who recently got a medal for the bravery of her husband who was killed at Corregidor. All sorts of fine people. It gives you a lot of pride to know about them.

I GUESS folks like these never worked in factories before, from all I've heard. Sometimes I wonder how they can take it. There's an old lady, for instance, I pass every day going to the washroom. They say she lost her son. She stands all the time, doing something at a punchpress. She is red-faced and dumpy, and her hair is white and bobbed in a stringy way as if she didn't care how she looked any more. Now and then as I go by she is crying. She does it silent like, without stopping her motion a second, even to wipe her eyes. Sometimes, when I get so tired, I wonder about her.

Now and then you read a piece in the paper that sounds as if the "war-workers" had only one thought — to get rich out of plushy jobs. For my own part, I don't know anybody like that. I don't think many workers have much to save after deductions for bonds and taxes are taken out of wages; you pay high prices for rent and food; you don't get much for your money, at that.

War plant work is hard work. You spend hours getting back and forth. You are always crushed in crowds. You often have a hard time getting what you need to eat, because the shops are half the time sold out. A visit to a beauty shop, even a shopping trip, becomes a luxury. You don't have much leisure on a six-day week, with work through holidays taken as a matter of course, and your washing and housework done when you can snatch the time.

Nobody with any gumption would do it just for the money. You could make much more nowadays just as a maid, what with room and board, and your whole monthly wage left free to put in the bank.

So I get sore sometimes when I hear it said that my people are "getting rich" out of the war. That's the way I sometimes think about them now — my people, helping me and Don.

Of course, it's just an idea. But I sometimes wish all the folks in the country could stand here with me a minute, and look down that line of Liberators to the far point where they seem to disappear. Just at that point is a door. From here you can't see it. But it's as tall as a six story building. Every so often it opens, slides right up, at the press of a tiny button. Immediately another Liberator rolls out, all ready to fly.

That same moment folks are beginning a new Liberator assembly at the other end of the line.

If you could watch here a little while, maybe you'd understand a little better what I've been trying to express. I mean, about how you can easily imagine things. How all these folks are just your own people working specially for you. How all the great line of Liberators is yours, too. Even if it isn't really.

...in a War-Time Town

"You're always just an island in thousands of people," says Cassie Giles. Cassie works in the great Fort Worth plant of Consolidated Vultee. Here and on the next two pages you see corresponding scenes in the life of workers at San Diego, where the mother plant is located, and the first Liberator was born.

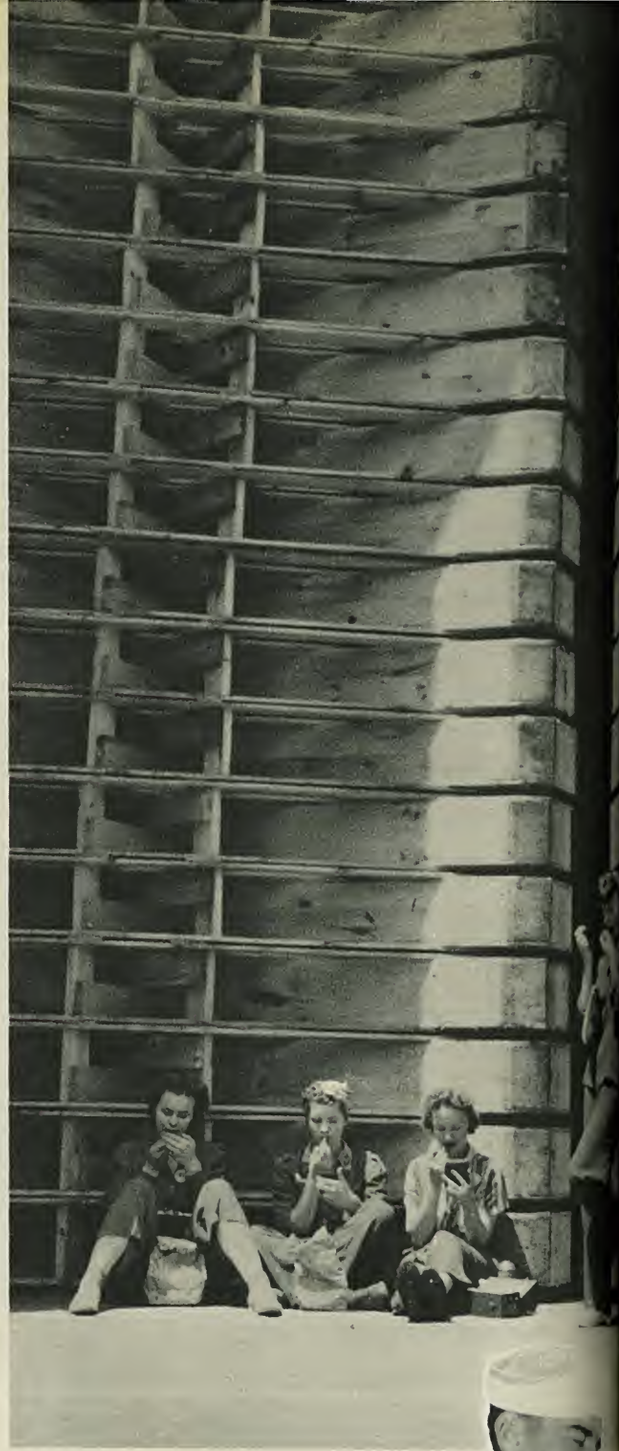
Crowds coming to work — crowds in employee rallies — crowds going home. You never escape from crowds.

Army and Navy men feel completely at home in San Diego — they line up there whether to get into cafeterias, or movies, or just a tattoo shop.

Getting your laundry and tailoring done quickly isn't easy, whether you are a civilian or a service man just back from some distant war theatre.

• • •

San Diego no longer is the paradise of the retired. Everybody works except service men on leave, everybody struggles good naturedly for the busses.



Shoe shine boys and barber shops do a rush business all day to midnight.

IN DIEGO
S JAMMED

town is bursting its
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Some workers buy lunches at the plant, many bring it from home. Either way, one doesn't worry about table manners. For many of America's women, now backbone of war production, this is new experience.

Stores and food markets cooperate with San Diego war workers and remain open to accommodate those of all shifts as they flock to make purchases.

• • •

When you get into a restaurant, standees waiting for service may breathe down your neck. But San Diego is getting its share of steaks and roasts.

boys
hops
iness
ight.

Test Engineer in Alti-chamber receiving extra equipment through the "equipment lock".

Research for TOMORROW

Adjusting pilot's oxygen mask before he enters Alti-chamber.

OUR age is the first in history when men experienced sensations the race never experienced before. These include travelling at high speed, descending to the depths of the ocean, and rising to the outer realms of the earth's air envelope.

The great new alti-chamber that Consolidated Vultee has built at San Diego is one of the ways devised to study the effects of such a new experience on the human organism. Similarly, a hot-and-cold room has just been completed at Vultee Field, to permit engineers to study the effects of temperature changes ranging from 150 to —100° F.

We have already learned some fascinating things about altitude changes. For instance, sinus trouble is often relieved, and the sinus passages drained, when a sufferer is put in the negative air pressure prevailing at 10,000 feet.

But new troubles can be induced. For example, pilots with fillings in their teeth have recently developed toothache at high altitudes; but on landing they cannot tell where the pain was, and the X-ray does not help. Present treatment is to remove the metal fillings, and substitute new ones over a non-conductive cement base.

The air pressure of 14.7 pounds per square inch at sea level declines to 2.17 pounds per square inch at 40,000 feet above the earth. Hence the growing shortage of oxygen for the human organism as man ascends, and the need for oxygen masks, without which anoxia develops — an illness that first lulls the senses, then dulls the judgment, then sends the victim to his fate unknowing. Or madness may sweep the mind.

At 10,000 feet the flyer usually adjusts the valve to breathe 30 per cent oxygen through his mask. At 20,000 feet he will want 50 per cent oxygen. At 33,000 feet he must have it 100 per cent pure. At higher levels even this is not sufficient, and the 100 per cent pure oxygen must be driven into the blood under pressure.

Many things we already know — such as that "bends" can develop from too rapid a change in pressure for airmen, just as for divers; the cause seems to be the bubbling of the nitrogen in the blood. And many things are yet to be learned.

To help discover them, the great reinforced ten-ton altitude chamber at San Diego has been built for research. Here the air pressure can be adjusted to simulate any altitude; similarly, the air temperature can be correspondingly reduced to the low temperatures prevailing high above the earth. Such temperatures can seriously affect plane performance: the hydraulic fluid usually used in planes freezes at —50° F., for instance; gasoline freezes at—90° F. and rubber becomes as brittle as glass.

Pilots come to the alti-chamber for training in the use of oxygen equipment, and for testing of their physical responses at high altitudes. Here engineers test materials, equipment and instruments for performance under stratospheric conditions. And here is conducted the aero-medical research that is being done for Consolidated Vultee by Dr. H. F. Helmholtz, Jr., and Dr. A. Randolph Sweeney, who were both previously associated with the Mayo Aero Medical Unit.

The flying of tomorrow will be faster, safer, and more comfortable, because of such research being conducted today.

Patrolling with the CAP

Action Picture of a Stinson Voyager

By
Major George E. Haddaway

★

Before the war, Stinson planes were sometimes considered a rich man's plaything. Today, those sporty Stinsons, along with many other fine light planes of pre-war vintage, are doing yeoman service in the Civil Air Patrol. The CAP is using them on one of the really romantic jobs of this matter-of-fact war. Major Haddaway writes about the CAP and its 80,000 members as a Coastal Patrol Base Commander.

★

MANY a CAP pilot, bouncing about in his little plane on a gusty day three or four hundred feet above the ocean, has spotted a fishing boat nosing into the whitecaps and has yelled to his observer:

"Lordy, I'm glad I'm not out here in one of those."

Yet they ride with confidence in aircraft actually more substantial. CAP pilots by now have flown more than 20 million miles above the Atlantic and the Gulf, searching for enemy submarines in planes that are almost toys.

To an Army or Navy airman, accustomed to flying sleek metal pursuit ships, or big bombers with wings so sturdy that fifty men can stand on them to pose for a picture, a little airplane covered with fabric through which you could stick your fist in one gentle blow may seem a mischancy thing.

But planes like that get us there and bring us back, often in weather that keeps the big bombers roosting on the ground.

Before the war they were sport planes, scarcely considered as of any potential military value. Today, they are flying sturdily on patrol, courier, and training service. And they will continue to fly as long as there is baling wire to hold them together.

At the time of Pearl Harbor, America had in its civil aviation a backlog of air power few of the general public realized.

Much has been said about the role of the airlines. But their total fleet on domestic routes had been only 350 planes, and was substantially less when we entered the war.

Not enough has been said about the 25,000 aircraft then in private hands, at more than 2,000 civilian airports throughout the country. These were the real basis for the fast manning of our air forces. For in these planes more than 100,000 private pilots, and a comparable number of student pilots, had been trained. In addition, they had fathered thousands of mechanics, airport experts, service men, and other craftsmen vitally needed.

"An assignment tough for any organization."

Those men in this qualified group who were fit for military service were taken up and away as fast as they could be sworn in. Still left was a sizeable army of men and women with trained aviation skill who could not qualify by reason of age, disabilities, dependents, or essential civilian duties.

So, just before Pearl Harbor, the Civil Air Patrol was created to mobilize these folk and their equipment for wartime duties. A Wing Command was formed in each of the 48 States, and local units were chartered in more than 1,000 communities.

Soon, on flying fields and in meeting halls, these air enthusiasts could be seen marching in military formations, studying Morse code, practicing first aid, and learning the many things it takes to transform a mob into a disciplined organization. From many a hayfield airport, planes took off under CAP operations orders to learn the technique of search, patrol, signaling, and air-ground maneuvers.

JUST as the boys were beginning to think, "Well, we're getting pretty good. So now what do we do?" an assignment came that would have been a tough one for any organization.

U-boats were raising havoc with our shipping and becoming increasingly bold. The regular armed forces, in desperate need of all flying equipment in other parts of the world, could not spare enough planes to cover the thousands of square miles of ocean which had to be protected.

Spokesmen for CAP clamored to give the civilian pilots a chance to fill the gap. Always liberal in accepting military innovations, General Arnold offered them this opportunity as a part of the Army's contribution to the anti-submarine campaign.

At hastily improvised bases, groups of selected volunteers took off on patrol over the waters where ships had been torpedoed almost daily. Unarmed and unprotected, the little CAP Coastal Patrol planes flew on daylight watch.

Subs crash-dived on their approach; some were destroyed by Army or Navy bombers summoned by CAP radio. So successful was the first experimental operations that a series of CAP bases were set up along the entire Atlantic and Gulf Coasts from Canada to Mexico.

Contrary to general impression, the Coastal Patrol is not flown by the smallest planes such as the "Cubs" and "Grasshoppers" you have often seen at your local airports. These lighter models were tried at first. But there was always the danger of offshore winds. If a 60-mile-an-hour airplane was 30 miles offshore with only an hour's gas left, it would face a big gamble in getting back against a 30-mile wind.

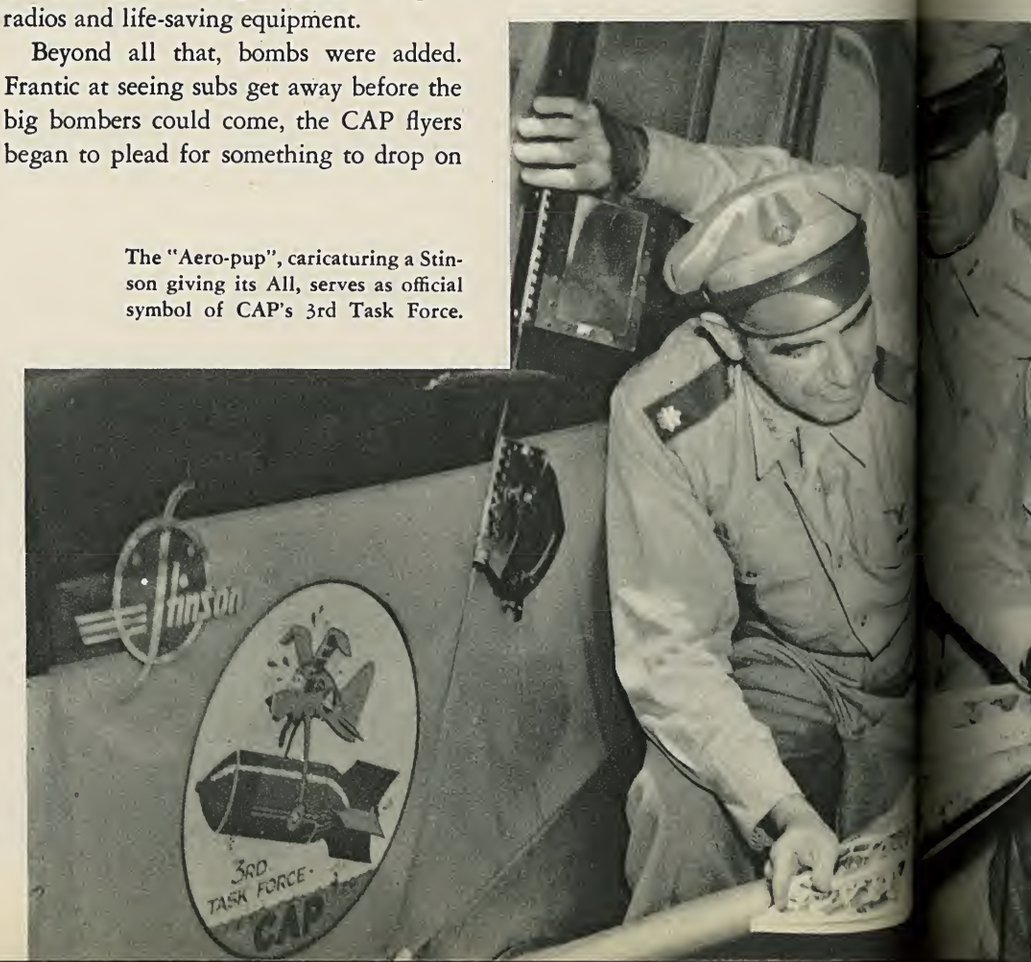
Aircraft heavier than the two-seaters was obviously needed. Planes of the Stinson class with upwards of 90 horsepower, and seating capacity of at least three, were specified. Although the usual coastal patrol flight carried only the pilot and the observer, they needed plenty of fuel plus radios and life-saving equipment.

Beyond all that, bombs were added. Frantic at seeing subs get away before the big bombers could come, the CAP flyers began to plead for something to drop on the enemy. Like the Coastal Patrol itself it seemed a screwball idea. But it worked.

Specially designed bomb racks were fitted to the lower longerons. Bomb sights were improvised out of scrap materials. To date, bombs have been dropped against no less than 81 submarines from the little planes, staggering over the water with loads far beyond anything they were designed to carry.

STINSONS have played an extremely important part in this work. The emblem of one of our Coastal Patrol bases is an aero-pup, panting over the water, almost exhausted but persistent, gripping a big bomb. To any civilian pilot, this emblem is immediately recognizable as the caricature of a Stinson plane, faithful and dogged whatever the assignment.

The Stinson is far from being the only plane on CAP Coastal Patrol — there are other mighty good ones in its company — Fairchild, Waco, Beechcraft, Howard, and Cessna, not to mention them all. Further every pilot has his own personal preference. But there are more Stinsons on this service than any other one make. Our pilots have lots of confidence in them — confidence and affectionate regard of the sort that is displayed in the aero-pup emblem.



The "Aero-pup", caricaturing a Stinson giving its All, serves as official symbol of CAP's 3rd Task Force.

The CAP has a Wing Command in each of the 48 States, local units in over 1000 Communities.

While the more spectacular work of pa- along the coast has attracted greater ntion, CAP units out through the coun- have also been pioneering another kind service in courier work, devoted to haul- rush shipments of spare parts and mail the Army and for war industries.

For the Second Air Force alone, light nes are flying more than 25,000 miles day on regular routes and schedules. is service amounts to a miniature airline nd not so small either, except in the of its planes. It links widely separated my establishments throughout the West.

The pilots know the terrain so well they fly through the mountains rather than r them. They take off when big planes grounded. In the event of impassable ther enroute, they can put down almost ywhere and wait for it to blow over. In nt months as much as 97 per cent of eduled trips have been completed. This a fine record on anybody's airline.

In the East, at many an Army field, CAP nes and pilots are standing by for rush ps, often to take repair parts to grounded mbers. A variety of other missions, such as "tracking" flights to give aiming practice the anti-aircraft guns and searchlights, so are flown. In the Midwest, CAP has established dozens of industrial courier sta-

tions to carry urgent shipments for war industries. Stoppage of assembly lines has often been averted by these deliveries. Where landings cannot be made, pilots drop packages by paper parachute. CAP service does not compete with commercial carriers, but is purely a wartime emergency undertaking.

These successful demonstrations may have a marked influence on aviation development after the war. Up to now, the airlines have drawn their traffic mainly by ground travel within a limited distance from each of their terminals. If a network of air feeder lines comes into each airport from over a wide radius, the airlines obviously will have a far wider market area, and can offer almost a door-to-door service.

In this way, every American community can receive service. Towns with no airports can get air mail by use of the pick-up device, with which a plane can drop and carry away mail pouches without landing. Overnight delivery of all first-class mail to any point in the United States is feasible by feeder routes of the type flown by CAP.

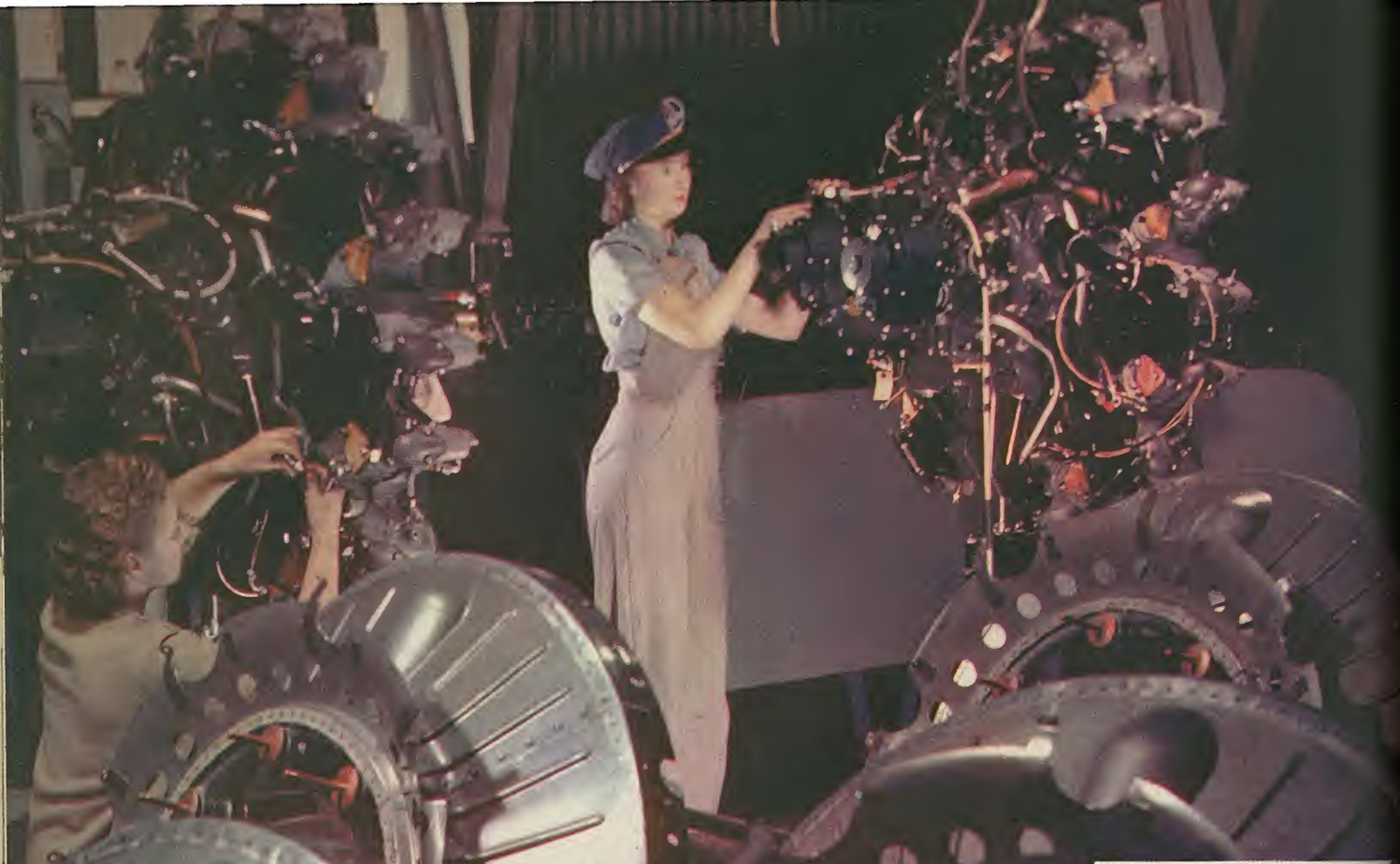
Cost on CAP courier have been as low as one mill per pound-mile. Of course, a commercial service would have to meet a good many items of expense which do not figure in CAP's wartime work. On the other hand, the full economy of the operations has not yet been developed, since nearly all of CAP's inland flying is done in slow ships of the 65 horsepower class, which carry only up to about 250 pounds of cargo. Slightly heavier planes could fly more economically with heavier loads at faster speeds.

IN the earlier days of CAP courier, Stinson Reliants and Voyagers were used in a number of areas with good results. But these larger models were needed on the Coast, and were therefore withdrawn from inland assignments. Because other war services also have bought or requisitioned large numbers of private aircraft, there are few of the bigger planes left at civilian flying fields, except a few old clunkers that creak in every joint, and throw more oil on the windshield than on the bearings.

There are still a number of Stinson 105s, however. Since these ships are 75 horsepower, a little too light for Coastal Patrol, they have been in great demand on CAP courier missions. For they have an extra something over the puddle-jumpers, and feel more like an airplane.

As the CAP courier system develops new routes and new methods, more and more observers are becoming convinced that the future of aviation will be made not only by the big flying boats and airliners which will encircle the globe. The light aircraft without which air services cannot be brought to the majority of the people of the United States will have an equally vital role. No elaborate plan or costly subsidy is necessary for this development. Just let home town aviation proceed with the least regulation consistent with safety, and you will see hundreds of thousands of airplanes in the air as fast as the manufacturers, after the war, can fill the demand.

We enthusiasts expect some post war improvements based on war experience. We are interested in the progress of helicopters, gliders, and other innovations. We would like to have the airplane of the future put in our hands tomorrow, if we can have it. But if these future things aren't ready, we don't want to wait. Tremendous growth of aviation (which will incidentally do much to solve the employment problem for returned members of the air forces and for the aircraft industry) is possible with models based upon the reliable planes we already have in use. Make 'em — and we'll buy 'em and fly 'em.



Work on engine installation assembly at Consolidated Vultee.

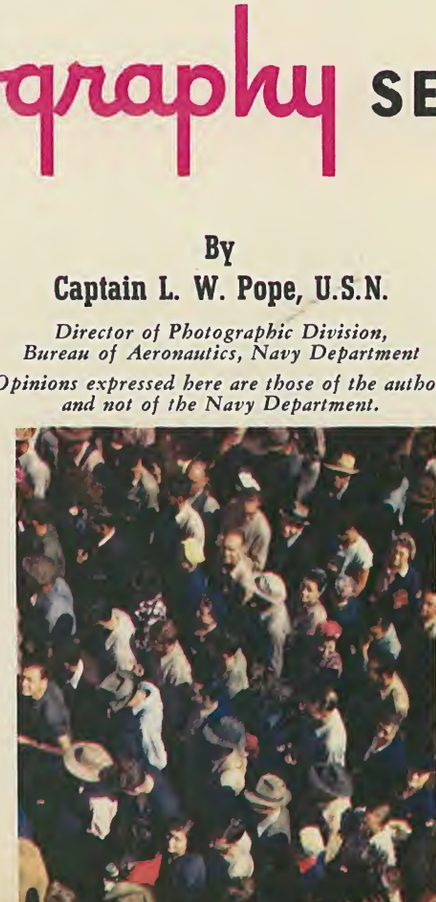
HOW Photography SERVES THE NAVY

By
Captain L. W. Pope, U.S.N.
Director of Photographic Division, Bureau of Aeronautics, Navy Department

Opinions expressed here are those of the author, and not of the Navy Department.

PHOTOGRAPHY has become so important to our forces that no commander makes a move against an enemy position without first having complete and detailed photographs of the enemy and his supply lines.

Pictures and their interpretation, which have developed into a highly exact science during the course of the war, provide the road map for invasion and attack. With the photographs that are now possible, and the expert analysis that is applied to them, a command gets an accurate estimate of where the enemy is and how his men are disposed, can tell what his supplies and equipment are, and can ascertain whether a particular position is being built up, maintained at the present level, or is being curtailed, together with a host of other data on the enemy's status.



Naval photographers are in the thick of the fight. When 29 of them were recently awarded medals and citations in the South Pacific, their group became one of the most decorated units in the entire Naval service.

Theirs was not artistic picture making at leisure, but part of the fight. Two of the 29 were killed in action, William Hickey, photographer's mate first class, and Harold D. Hogan, photographer's mate second class. For two others, Eduardo Pierce Brown, chief photographer's mate, and Joseph F. Muller, photographer's mate sec-

The kodachromes reproduced here, fine examples of modern photographic art, are all official U. S. Navy pictures taken by Navy photographers to show operations at Consolidated Vultee Aircraft.

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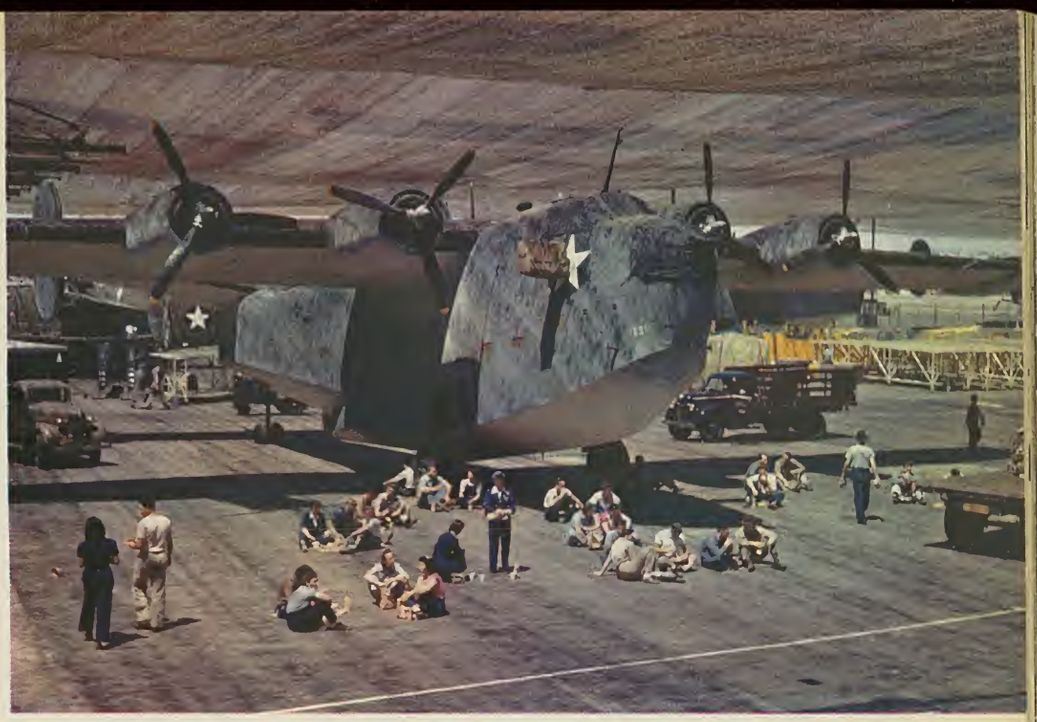


Camouflage nets overhead, San Diego workers drop down for lunch beside a Coronado flying boat.

...d class, this was the second award for outstanding service. They received gold stars in lieu of a second medal. Such awards are given sparingly.

The Division of Photography is spread all over the world wherever the Navy is in action, and acts for both the Navy and the Marine Corps. It is staffed by approximately 3,000 officers and men.

While reconnaissance photography is highly important to our operations, it is just one of the countless things for which the Navy uses cameras.

Pictures of the kind taken in the Consolidated Vultee plants, shown on these pages, are valued by the Navy for many purposes, not the least of which is to show Congress and the people where their money is going, and what Uncle Sam is getting for it. Such a record is particularly valuable where there has been considerable plant expansion, as at the Consolidated Vultee plants, and similar pictures are being made of plants all over the country. Technical divisions of the Navy, both auditing and engineering, use them for their records and for technical studies respectively. The Navy finds they have wide interest for the men who are being trained to fight as well as for the public, which wants to know how and where our battle planes are made.

Plant pictures have additional uses. From a tactical standpoint, they can be valuable in indicating needs for developing protective camouflage. From the attack viewpoint, Navy experts use them to evaluate the number of planes enemy nations can produce by comparing photographs of our plants, having a known output, with corresponding photos of enemy plants.

To enable us to profit by our own and the enemy's mistakes, a pictorial record is made of combat. In the midst of battle, the action is too fast for the human mind to recall; often parts of the action are too fast even for a person to see.

A camera gets the picture exactly, and does not change its mind on what might have happened. With pictures, the Navy can and does reconstruct exactly what occurred in battle. When damage is suffered, for instance, the officers can check on the efficiency of damage control parties, and change personnel or placement of materials or methods of control.

Photography not only has an immediate bearing on fighting the war. It is providing at the same time a historical record which will be complete and accurate. The public is getting only a part of this record as the war progresses, from pictures in the newspapers, magazines and newsreels. The file of battle pictures is already enormous, and when the war is over, it should prove of tremendous historical importance,

In one way the record is already being used as it will in the future. Today's battle pictures are even now being used to train new officers and men for the Navy, giving them something of the feel of battle, and vividly showing them what should and should not be done.

Photography now enables the Navy to learn things about new ship designs which it could never know in years previous until a ship had been built and put to sea — by which time it was too late. Today, photography shows what a new type of ship will do, and why, before it is even built.

Cameras are also proving successful now in one of the oldest jobs in the world — map making. This is not new; a large part of the United States has been mapped by cameras in recent years. But today photography is proving invaluable in charting some of our battle areas, as in the Southwest Pacific and the Aleutians, where places completely off the beaten path were never accurately charted outside steamship lanes.

Tail fin assembly at Vultee Field, where vast numbers of Navy basic training planes are made.

Church Army M... Canteen in En... serving Libe... crews at an airdr...

Don't say "Raid" say "Mission"

By
Fred B. Barton
(By Mail from England)

WATCHING Liberator bombers take off from an airdrome in the ETO — European Theatre of Operations — is restricted to the military personnel. Only they get close. If you wear a war correspondent's uniform, you may climb to the roof of the control tower. But not until the mission returns may you enter the briefing room where the charts of the flight are spread out for minute analysis.

Getting ready, after the crew are in place, covers more minutes than the take-off itself.

A Liberator bomber in flight is half man, half machine. The machine requires of its human partners only very reasonable things. But it is inexorable about enforcing these laws of its being. Upon the men therefore falls the double responsibility of thinking for themselves and for the machine. It can be their chariot of glory, if they operate it properly — or their grave, if they neglect its clear-cut demands.

Is everything clear down below? Are all the ground men away from the propellers? Then, and only then, does the pilot punch the button that spins his No. 1 engine — first on the pilot's left — into motion. Brakes locked, ailerons down, but otherwise ready to soar, the plane becomes alive.

Eyes on dozens of dashboard indicators, pilot and co-pilot check manifold pressure and oil pressure. Then No. 2 engine spins. This too is checked. Then No. 3 engine turns over lazily, gains power, the propeller spinning in almost invisible blurs. Then No. 4 engine.

Petrol is scarce here — scarce in every section of the European Theatre of Operations. Yet these youngsters will not take off until a sixth sense, evoked by thousands of flying hours, reads in the toned-down hum the message that the warmed-up engines are ready for steady, dependable work. Then, getting their signal from the control tower, one by one the Liberators taxi down the wide concrete road called the perimeter. Every plane has its special parking space, called a dispersal point. Here planes are parked in the open air, widely separated, so that no enemy bomb could

destroy more than a couple. One by they wheel down the center runway take the air.

It looks effortless, foolproof. But the ght control officers do their share of wor- ng from the sidelines. "Sweating them ," is the phrase they use. They note that first plane or two uses about three- ourths of the runway, builds up a legiti- ate speed and momentum, and takes the in safety. The next plane uses a little ss; the next still less; until the following anes strike out on their own with most the runway still unused.

The reason is that the wind-stream from propellers up ahead build up an air cur- nt, which deceives the sensitive instru- ents on your dashboard. You think you ve more ground-speed than is actually ue. And so, if you are not careful, you find ur plane climbing almost straight into air. Dangerous, that; because the wind- eam from up front hits your wings un- enly, so that one wing may rise and the er drop. New pilots don't believe this, d have to learn by experience. It is one the lessons that comes from flying in for- ation.

The formation is customarily a V shape, d the number of planes in a formation aries with the bombing program for the y. Because of this V, a whole broadside n be brought to bear upon any approach- g enemy craft, be it Nazi Focke-Wulf or hatever. And of course the formations fly different altitudes, the better to intercept d fight off the enemy and go forward to e day's bombing objective.

The success our young men in these Lib- erator bombers are attaining is news you n read back home in your daily news- per. The papers do not tell you all of e news, which is well. But at least you n see the steady progress on our eastern d western fronts alike. These air crews ours have learned unbelievably. Two ears ago, many of these boys were at work, school, innocent of any aviation knowl- dge. Today they are great airmen.

You would feel proud, watching at one these airdromes in the ETO, when our oung men come home from a day's ission.

Here comes a plane in which one of the en men has been badly wounded. But the ew administered first aid in the air. The an will recover.

Here comes a plane which literally went through a wall of flak — that explosive anti-aircraft stuff which hurls jagged chunks of metal in all directions at whatever height the enemy decides will be most unpleasant for our ships. Some of these bombing planes come back with as many as a thousand machine-gun and flak holes in them. Some come back practically burning, but still able to fly. Some have part of a wing shot off, but are able to glide back across the channel and mushroom to earth.

There's a technique to making a crash landing. The pilots stay forward. The eight others — navigator, bombardier and the six gunners — crowd into the radio room and press their bodies flat against the forward wall. Pilot and co-pilot land the plane on any soft patch (they hope for a brussels sprout garden, but will settle for any potato patch) with the plane flat on its belly, wheels retracted. With luck they slide a couple of hundred feet and stop. Without luck the plane can nose down into an unsuspected ditch, crush its gasoline tanks.

Some men don't come back. The others give all possible data at the session called the interrogation. Maybe a plane was forced down in enemy country. Maybe a crew parachuted from a burning plane: "hit the silk," is the expression. Maybe the men dived overboard into the open ocean and may now be waiting for a rescue craft. Not all those who fail to return are counted as dead. There still may be hope.

But of all such things the young pilots speak casually, if they speak at all. Of their own prowess in landing two-ton demolition bombs on a vital enemy ammunition dump or aircraft or submarine factory, they say very little. They have learned to be modest. Luck rides with him who takes little credit to himself.

Talk with these young fellows and you quickly note that their innermost thoughts are not on killing. They speak of "missions," not of raids. And indeed, a "mission" is far more than a raid; it is a battle where our men must often fight against enormous odds. War is their business at the moment. But when the moment of victory comes, then they want to get away from the smell of powder and the smudge of flame. They want to quit these foreign countries where you have to drink wine and warm beer because you never see milk and you can't trust the water. They are homesick for ice cream sodas and double malteds and movies and clean girls to dance with and company other than men.

They think a lot, too, about their jobs after the war. Naturally enough, many of them plan to go on with the training that a bountiful Uncle Sam has given them, at a cost of probably $25,000 per flying officer.

"For myself I'd like nothing better," says one bomber pilot with a score of successful missions behind him, "than to fly one of these Liberators on a fast freight route, say carrying fresh fruit from California or Texas to eastern U.S. cities."

When you see them landing back at your home fields, you fathers and mothers and uncles and big brothers back in the U.S.A., you can kill the fatted calf (or better yet, a steer). Have steaks, if you can. Have vegetables. Have fruit; any kind but plums.

You won't need anything wild to drink. Anything will be all right if it just has ice cream in it. Lots of ice cream.

Crew in England "bombing-up" a Liberator with 1000-lb. bombs.

How Shall We Bomb JAPAN?

NO news would be received with greater joy in this country — short of the complete defeat of the foe — than the news that Tokyo and the other great cities of Japan were under relentless aerial bombardment.

Its coming will be hastened by two factors: (1) Our acquisition of bases nearer to Japan; (2) the increase in the radius of action and bomb-carrying capacity of American bombing planes, of which the Liberator is a prime example.

Some explanation is necessary of the meaning of "radius of action" in the military sense.

It used to be said that the war radius of action of a given plane was about one quarter its extreme range with a stated military load. That is, if a certain plane could carry a load of 2½ tons of bombs for a total of 3000 miles, its war radius of action was calculated at 750-800 miles.

Of course the extreme radius is half the extreme range. That was halved again to allow for unexpected bad weather, enemy resistance (involving the use of fuel to fight or run away, instead of proceeding on a

Moves that are questionable are shown by arrows and planes in white; our probable strategy in black.

ight line to the target), errors in navi-tion, search for a target difficult to iden-y, and all the other unforeseeable exi-encies of air warfare.

This factor of error has been much re-uced owing to the improved defensive ament of bombers, their increased ceil-g (enabling them to avoid anti-aircraft e), improved methods of navigation and ather reporting, and better intelligence efing, enabling search for targets to be uced to a minimum.

Without giving away any secrets, there ve been recent reports from official urces of Liberator bombing operations er distances from base to target exceed-g 1200 miles. This is indeed rather more an 25% of the range, with any sort of fective bomb load. For the purposes of e war in the Pacific, where conditions e somewhat different from Europe, we shall be conservative indeed if we assume that Liberators can operate with good effect against precision targets 1000 miles distant from their base.

By "precision targets," I mean targets which can be attacked in daylight with medium bomb loads efficiently and economically; targets whose size is comparatively small, but whose destruction is of great importance. Such a target might be a great naval drydock, or a hydro-electric power plant serving a large industrial area, or a railway bridge on a main line railway.

"Area targets" usually require larger numbers of aircraft and larger bomb loads, and are in general more suitable subjects for night bombers. Here the radius of action tends to be shorter because of the larger bomb loads which are desirable. In Europe, most of the so-called saturation bombing — area bombing plus saturation of the defenses — has been done within 600 to 700 miles.

to limit the possibilities of bombing from that direction.

The conclusion seems inevitable that while island bases, plus carrier raids, may become of great nuisance and diversion value to us, really serious and continuous bombing of Japan must come from bases on the mainland of Asia.

Only there can be found room for adequate dispersal, so essential to the protection of air bases from enemy attack. And only there can we build up the vast supply and maintenance system essential to the operation of big bomber aircraft (such as Liberators) in large numbers.

We may wish that such bases could be put at the disposal of our air forces by the Russians, but we must recognize the compelling military considerations which force the Russians to take the attitude "One enemy at a time."

Major Eliot, military analyst for the New York *Herald Tribune* and the Columbia Broadcasting System, tells here what our probable approach will be when Liberators bomb Japan.

BY MAJOR GEORGE FIELDING ELIOT

A GLANCE at the map of Japan and surrounding territory will make it clear that if Japan is to be bombed, the bombers must have bases either (1) on the mainland of Asia; (2) on one or more of the innumerable islands of the Pacific Ocean; or (3) on aircraft carriers.

Carrier-based bombers are necessarily restricted in size and bomb-load.

Most of the islands of the Pacific, unfortunately, are either volcanic cones or coral atolls. The Bonin Islands, lying almost directly south of Tokyo, are within 600 miles of Tokyo itself and most of the industrial centers lying between Tokyo and Osaka. But they do not have room enough for large airfields, and if we took them — coming perhaps by way of Wake and Marcus Island — they would certainly be subjected to concentrated attack from Japanese bases. Paramushiru, northernmost island of the Kuriles, is within 1000-mile radius of the whole of Hokkaido, the northern island of Japan proper. But the weather conditions at Paramushiru are so uncertain as greatly

It remains, therefore, to examine the possibilities of bases on Chinese territory.

The best locations for such bases which are at present in Chinese hands, and available for our use if we can get there with sufficient equipment, are those in the vicinity of Kinhwa in the province of Chekiang.

This locality lies within the 600-mile radius of points in the southern main island of Japan — such as the great naval base at Sasebo, the seaport of Nagasaki, and the smaller seaport of Kagoshima.

It is within the 1000-mile radius of Osaka and Kobe, and Japan's Inland Sea naval base at Kure. Under favorable conditions, Tokyo could be bombed from these Chekiang bases. They offer about the best location for bombing fields that seems likely to come within Allied reach within the immediate future.

Undoubtedly inspired by the Doolittle raid on Tokyo, the Japanese in the Autumn of 1942 undertook to drive the Chinese out of this part of Chekiang, but were unable to hold their gains against a Chinese counter-offensive. Since then China has remained in possession of Kinhwa and the

surrounding region. The Japanese are, however, close at hand. They would undoubtedly make a strong effort to capture any bases which might be used for raids on Japan, as soon as such operations began.

Hence there are two problems to be faced: (1) to widen the area of Chinese-held territory around the proposed base locations; (2) to provide an adequate line of communications by which the bases may be supplied with fuel, bombs, spare parts, lubricating oil, and other stores, in sufficient quantity to enable a bombing offensive of real consequence to be undertaken against Japanese centers. Unfortunately none of these things are found or produced in China; they have to be brought in from British and American sources.

THE first problem is one of providing the Chinese with weapons and equipment, and above all giving them the support of a good tactical air force.

The second problem, which really includes the first, is the key to the whole puzzle. There are signs that its solution is to be undertaken from India and Ceylon, by means of a large-scale campaign for the reconquest of Burma.

This campaign should be well under way by the first of the year, possibly before. The complete success of this Burmese campaign will result in the reopening of the famous Burma Road, plus the providing of a somewhat shorter and easier route for the transport aviation on which General Chennault and the Chinese armies must now depend for all their supplies from the outside world.

The capacity of the Burma Road is not very great. Even when it is fully open, and restored to its fullest former efficiency, it probably cannot carry more than 10,000 to 15,000 tons of goods per month. But if this amount of tonnage can be strictly controlled, and devoted almost entirely to the support of an Allied air force in China, it can make a great deal of difference in the ability of that air force to carry out its missions.

Obviously these missions cannot be on the scale of the Allied bombing of Germany.

On the basis of the gasoline required by a Liberator for a nominal bomb load from a Chinese base to Japan, the Burma Road would be able to provide only for six 200-plane raids over Tokyo, each carrying 500 tons of bombs, in a month. Actually the figure would be far less, for much gasoline would have to be used for giving fighter protection to the bases, and fighter escort as far as possible to the bombers. And there are many, many items needed for bomber bases besides fuel and bombs.

We should not, therefore, expect too much too soon, in the matter of reaching our Tokyo target with the bombs that are now being manufactured for it. But the way to begin is to begin. If the opening of the Burma Road is only a beginning, it will lead to greater accomplishments.

Under American control the capacity of the road may be increased; likewise we can and will increase the capacity of our air transport into China. Moreover, driving the Japanese out of Burma will not be the only move we shall make in southeast Asia. From Burma we shall go on to Malaya, Thailand and Indo-China, opening new bases and new sea routes which may in the end give us command of the South China Sea, and a clear line to Hong Kong and Canton. A single big tanker arriving in a Chinese port can bring in as much gasoline as can be hauled over the Burma Road in a month — and the day may not be as far distant as it now seems, when the seaway to China will be open.

Remember that even a beginning in bombing Japan will have a very real and immediate effect on the whole Far Eastern war. The Japanese will have to abandon outposts now strongly held, in order to protect their home centers. In so doing, they will open to us many gates of opportunity which are now closed.

That is why it is so important to make the beginning that will lead inevitably to such results, and that will be so tangible a step forward toward complete and final victory. And the very strategic and operating difficulties that stand in our way make it all the more necessary that we increase the numbers, the quality and the performance of the aircraft which must be employed under such difficult conditions.

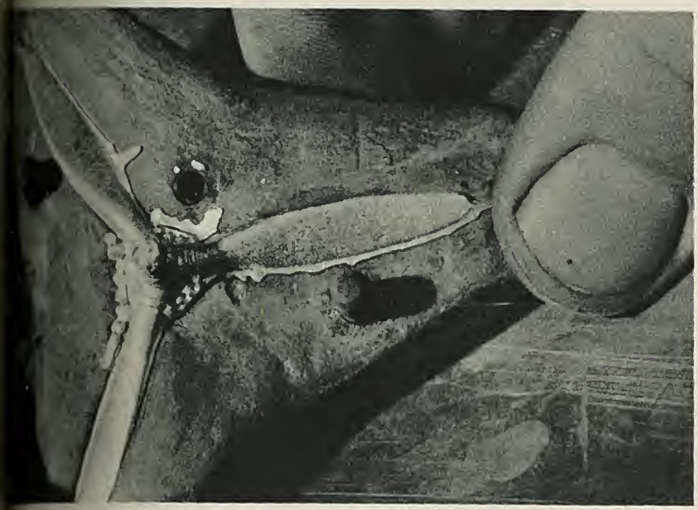
It is in recognition of the way in which Liberators have overcome such difficulties that Brigadier General Victor H. Strahn, chief of staff of the 9th Air Force, said: "To my mind there has been no weapon available to our forces in this war of which we can be more proud than our Consolidated-built Liberators."

Press Association Inc.

A Liberator takes off in China over the Flying Tigers of General Chennault.

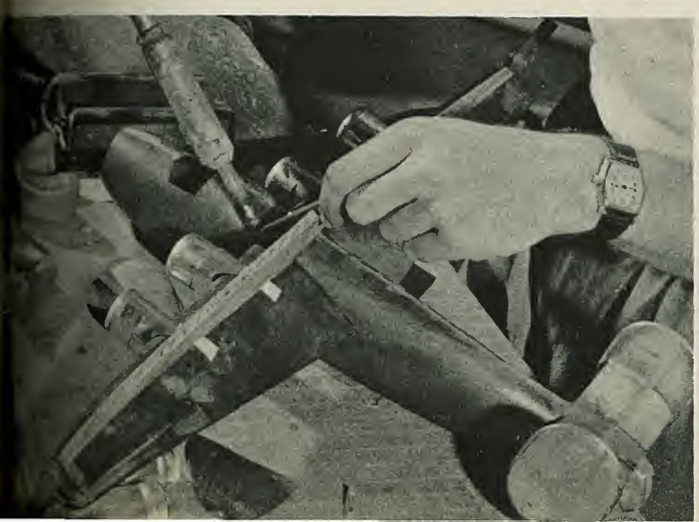
Liberators for Lilliputians

At Vultee Field a miniature Liberator production line has been operated for three years by young twins, Howard and Harvey Doering (above), who are so busy making superb plane models for technical use that they have eight assistants working under them. They began building models as 12-year old school boys, got $1500 for one they spent 13 months in completing with motors, upholstered seats, and a lighting system. Much of the work done by the Doerings, who were both refused enlistment by the Airforce, is now considered restricted military information.



Above, the bottom half of the mold in which propellers are formed.

Above, molding parts on wood blocks; below, soldering one in place.



An assistant fits a plexiglass nose into its position.

Design for Flight

The Liberator Model

Shown left to right above are H. A. Sutton, director of engineering, T. P. Hall, chief development engineer of the San Diego engineering group, and I. M. Laddon, executive vice president, viewing the B-24 wind tunnel model in Mr. Sutton's office.

TODAY'S planes are complicated. The 28-ton Liberator contains 102,000 parts. That is one of the reasons the organization chart of the design engineering division would reveal a bewildering number of connected small squares. Each represents an important subdivision of the work that must be done in the designing of a new plane.

One group of engineers, for instance, is chiefly concerned with the design of hulls and fuselages. Another group specializes in wings and tails — another in problems of power plants — another in armament — still another in electrical equipment and radio.

A big bomber today is not only an elaborate fighting machine. It is also a hotel, prepared to feed, sleep and otherwise attend to the personal necessities of a crew of from 6 to 12 men — and, perhaps, a few passengers — for a day and a night at a time.

For instance, it houses an auxiliary power plant to supply electricity to operate lights, radio, instruments, the inter-communicating telephone system, power turrets and battery chargers. It also has a heating and ventilating system. Now none of these pieces of auxiliary equipment has much of anything to do with whether or not the plane will fly. The wings, motors, propellers, empennage and fuselage determine that. But all of them are vital.

Obviously, not all the hopes and dreams of the perfect airplane can be satisfied in any one aircraft. If everything that everybody thought it nice to have in an airplane were installed, it could grow to the size of a battleship and have about the same chance of flying. If, on the other hand, everything were left off that would have to be omitted to achieve the ideal in range and speed, anyone larger than a midget would be disqualified as a pilot. And any

Designing a great airplane is today a huge joint operation. Hundreds of expert workers are organized to do the job.

The design division of engineering in an aircraft plant could well be likened to an army.

As the Army has its Chief of Staff, so has the engineering department.

At Consolidated Vultee he is I. M. Laddon, executive vice president of the company.

Directly under Laddon, is H. A. Sutton, in charge of the "theatre of operations" in design engineering. He has a headquarters staff. It is composed of A. F. Fontaine, assistant to the director of engineering, and B. W. Sheahan, engineering manager.

In active command of the chief sectors are T. P. Hall, chief development engineer of the San Diego development engineering group; C. R. Irvine, chief development engineer of the Vultee Field development group; and E. D. Shannon, chief of flight research department. These men are the Pattons, the Clarks, and the Montgomerys of the design engineering division — men in direct charge of the action.

Here is the story of how they and their assistants proceed to convert paper specifications into a plane that flies. Though this article describes operations at San Diego, the same general procedure is followed in the design of those planes developed at Vultee Field.

thing larger than a firecracker in the way of bombs could not be carried.

In the face of these two extremes, the design engineers embark on the only possible course. They must compromise.

A little is left off here, a little is trimmed off there. Nights as well as days are devoted to drawing and re-drawing parts to gain maximum strength with minimum weight. Manufacturers' reports are scanned eagerly for new materials and products with improved performance characteristics.

Only one element escapes this paring process. The factor of safety remains constant. The design engineers never forget that men are going to be flying these planes.

AN aircraft engineering department has numerous parts. The design division does just what its name implies: its business is to design the planes that will later be put into volume production.

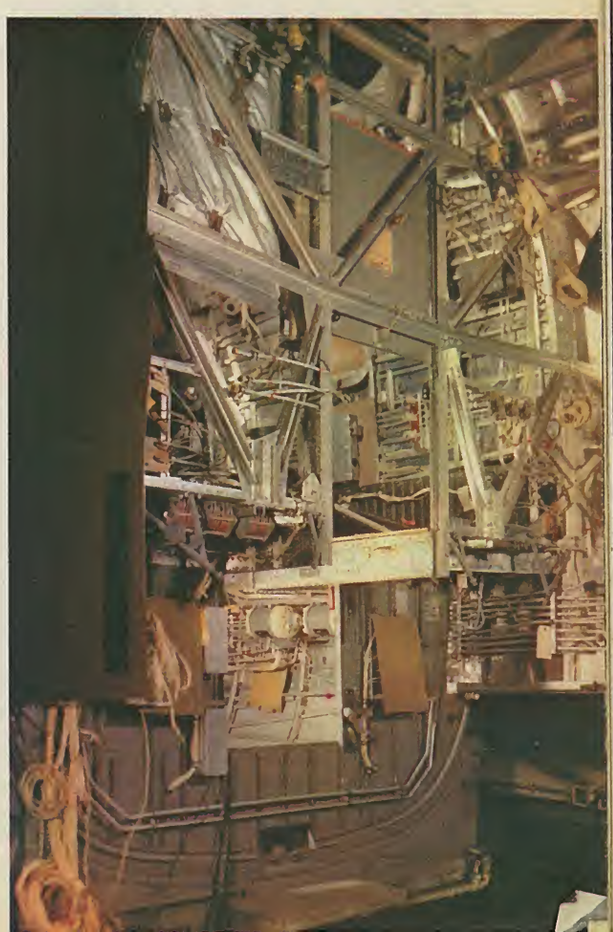
Today no first plane is ever built to satisfy some engineer's personal dream of an ideal. The first model of a modern plane costs millions; it has been estimated that the first flying model of a new 100-passenger transport will cost Consolidated Vultee around four million dollars. Obviously, somebody must want that plane very seriously, before orders to build it are issued.

That helps explain why all new planes today are designed to meet a specific purpose. There are three usual sources of impulse. Before the war, management itself might put the design engineers to work on a project for which management foresaw a specific market. Or a commercial operator of air transport lines might ask for a new design. Today, in wartime, the government has a monopoly on the purchase of planes, and orders come from the Army and Navy exclusively.

Suppose, for instance, that fighting front developments have convinced the Army it needs a new plane with certain flying and fighting characteristics. The Army Air Force then draws up a set of general specifications, describing what the desired plane must be able to do.

These form the basis for a set of detailed specifications prepared by the engineering department. The detailed specifications are very important, for they will clinch an understanding between the manufacturer and the Army as to what kind of plane is to be built, and what characteristics and qualities it will have. They also set the objective toward which all members of the design engineering division will work.

The first part of these specifications will describe the type of airplane the Army desires — whether a bomber, an attack plane, a liaison plane, or some other type. Then the class of plane is defined — whether it is to be a four-engined heavy bomber, a two-engined medium bomber, or what not. Then the specific job the plane will be expected to do is described in detail. If the



The intricate layout of controls, instruments, wiring, tubing and control cables in the nose fuselage section of an airplane must baffle the layman, is only a challenge to the design engineer.

The army of trained men and women at the drafting boards is as vital to our nation's air supremacy as our air armada and the trained men who fly it.

airplane is needed for long range, daylight precision bombing, the specifications will state just that. The requirements as to performance, armament crew accommodations, equipment, structure and design features will all be explicitly set down.

When these specifications are approved by the Army and returned to the San Diego division of Consolidated Vultee, there is a conference. H. A. Sutton, director of engineering, and T. P. Hall, chief of the San Diego development engineering group, sit down with "Mac" Laddon, their chief, to settle the "general policy" of the design. What horsepower will be needed in the motors? Can existing materials be used, or must new ones be found? What type of wing is most suitable? These are samples of general policy questions.

IF it appears the new plane can be designed to meet the requirements of the preliminary specifications, Hall goes into a huddle with R. L. Bayless, head of preliminary design. Bayless and his men labor in a separate office. And they are one group who never bore you by talking about their work at the dinner table. What they do today is strictly a military secret.

Out of the general specifications which Bayless receives from Hall come eventually a series of three-view sketches. These present the outside appearance of the proposed plane from three different angles. They visualize approximately what the new plane must look like, if it is to do the job assigned to it. These three-view drawings correspond to an architect's preliminary sketch of the exterior of a new house.

To these three-view drawings is added an "inboard profile." This presents the interior arrangement of the new plane, with the main structural features indicated but not detailed. The inboard profile might correspond to an architect's floor plan.

These proposal drawings now go to Hall, who again consults with Sutton and Laddon. Out of the several submitted, one set is selected to become the blueprint from which a small scale model is constructed for wind tunnel testing. At the same time models of various wing sections are also prepared. These models then are also wind tunnel tested. Changes are then made as the tests indicate, and the end product is a rough approximation of what the plane is going to be.

While this has been going on, Sutton has been busy on another phase of the problem. He has been looking for plant space to house the experimental design work, and for personnel to handle the job. He confers with W. S. Cockrell, who is experimental factory manager, and C. B. Carroll, chief project engineer. Out of their conference comes the decision on the right engineer to head the project, where it will be carried on, and when it should be finished.

At this point Carroll, the project engi-

Women as well as men are playing important roles today in Consolidated Vultee drafting rooms.

...er, goes into action with P. A. Carlson, ...o as chief group engineer heads eight ...epartments specializing in various sub-sec...ons of the plane. Each of these depart...ents is given a "plan view" of its particu...r part of the plane, and goes to work. The "plan view" is merely a rough outline, with ...e outside dimensions carefully noted. What a department may do inside those ...mensions is its own business. How well ...e knows this business will have a lot to ...o with the success or failure of the plane ...hen it is completed.

CONCURRENTLY with the work of the group engineers, the aerodynamics group under the direction of chief design ...gineer Bruce Smith has been making a ...w model for further wind tunnel test...g.

This is a beautifully scaled job. It is ...mplete down to nacelles which are hol...w, control surfaces that operate by remote ...ntrol, motors that are scaled to the horse...wer of the full size power plants. Even ...e carburetor air intakes are included. It ...s an exact replica of the finished plane in ...erything except size.

Out of these additional wind tunnel tests ...me ideas for changes in design that are in...rporated in the model. They are also in...luded in the drawings being made by the group engineers. When special difficulties ...e encountered by them they call for the ...rvices of other members of Bruce Smith's ...partment, such as the men who specialize ...n power plant design, or in electrical and ...dio design and thermo dynamics.

Every department of the design engineer...g division is now at work on the new ...lane. Of course, this is probably not the ...ly new plane that is being projected. And ...t every member of the design division is ...rking on this plane alone. But many are, ...d others are ready to come in when the ...casion arises for consultation.

As the drawings for the various parts of ...e plane begin to come from the group ...gineers, its actual construction begins. This is the moment for which Cockrell and ...s crew have been waiting. Most of this ...nstruction work is done in the engineer...g building. But other departments in the ...lant are also used, if any parts call for tools ...r machinery not available in the experi...ental factory.

Gradually, the new plane takes actual shape. This first plane is called a proto-type. Its completion is not the end of the job, by any means, but it is a major climax in the project. It is hauled out to the ramp, and turned over to the flight research department. There E. D. Shannon and the test pilots begin the exhaustive series of flights which will confirm all the calculations, all the designs, and all the hopes of the design engineering division.

Out of these flights will come many modifications of the proto-type. But seldom, if ever, do the test flights result in a design change of major proportions.

During these latter stages in the work of creating a new plane, there has been a succession of apprehensive gentlemen peering around the corners of nearby buildings. Contrary to what some strange observer might suspect, these men are not Nazi spies. They are the production engineers; they are doing a little peeking and early worrying about the problems they are going to meet when the new ship arrives at the front door of their own biggest building, with orders to put it into volume production.

Their task is another story. The design engineering staffs have already gone back to their drawing boards, are deep in the intricacies of another new plane that is needed to do some other special kind of job.

On great sheets laid on the floor of the lofting room, full-scale drawings are made of a plane.

Above, a line of Liberators at the Fort Worth plant with the new Emerson-powered gun turret in the nose; and left, a closeup of the turret, which can revolve in a wide arc. The bombardier's station remains in the nose.

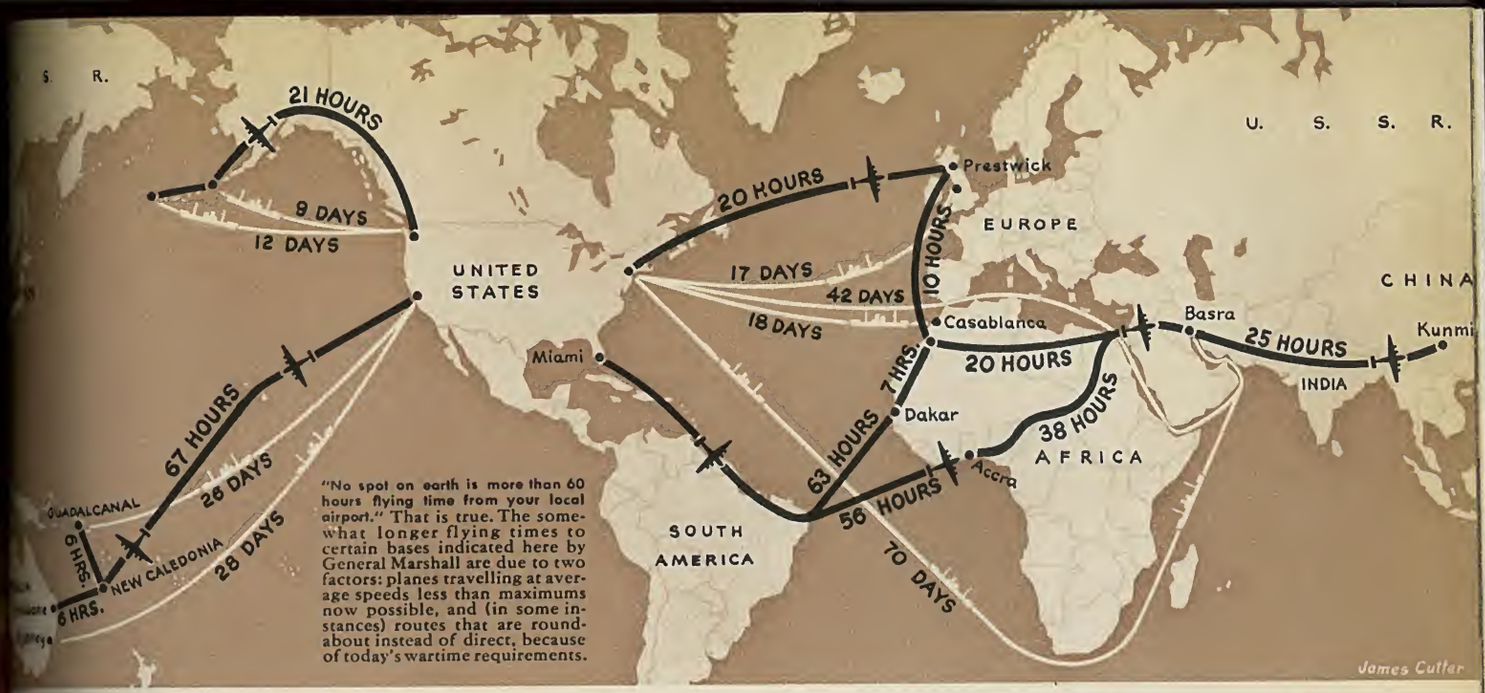
Above, the tail with its Consolidated-powered turret holding twin guns. The tail gunner mans a most vital combat position.

Business Ends of the Liberator

These are the four power-operated turrets of the Liberator bomber — deadly for the enemy. As Peter Masefield, British expert, points out: "The new nose turret combines with the ball turret to insure that deeper penetrations than ever before can be made over enemy territory."

Below, the retractable Sperry ball turret in the belly, a difficult position for a gunner unless he is a small and agile fellow.

Below, the Martin-powered top turret, one of the best positions for observation. All turrets carry two guns.



This map showing A.T.C. Air Routes and present average flying times is based on Time and Space Chart in the Biennial Report of the Chief of Staff of the United States Army.

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THANKS to the Air Transport Command, you can travel practically anywhere in the world today — and do it practically without money — if you are important enough.

War creates its own scale of importances. Sitting in the social register or the possession of a bank balance no longer suffices to make a citizen on the international scene. Today's world travellers by air are generals; engineers; uniquely skilled mechanics for whom some operation has a desperate need; Red Cross workers; specially selected news correspondents; emissaries of rulers. Those are the people you'll meet aboard your A.T.C. express plane.

If you have a No. 1 priority, you are practically a Presidential representative or are travelling on orders cleared through the White House. Madame Chiang Kai-shek would rate a One priority. So would observers surveying the foreign scene; so would Ambassadors and Cabinet members. Ferry pilots on their way to pick up more planes for delivery to some theatre would be included in this group — the speed of their work is vital to the national interest. Generals on ordinary missions usually get a No. 2 priority, along with diplomats and Red Cross Executives and their peers. Numbers 3, 4 and 5 would fall to technicians, officials, nurses, builders of air bases, officers returning to post, war correspondents — all ranked according to the immediate importance of their mission. If they were officially needed at some spot in a rush, they would ascend the preference scale. There have been times when certain technicians were rushed out with a No. 1 rating.

If you yourself are listed to travel among the esteemed, have no illusions that your importance will secure you Pullman comfort. The old Atlantic Clipper service is still operating with Boeing 314's and 307's, offering some of the pre-war comforts. But most of the unnumbered daily trips that link us with our war theatres are flown by war time planes like the Liberator Express — planes that allow minimum space for comfort, and maximum room for freight.

You may be an Ambassador or a Senator or a General in the top ranks. But when you travel on one of these war planes you are just a soldier in the service. You are perhaps going to sleep on the floor — if you can — with freight under your head and some other dignitary's feet in your face. You are probably going to rustle your own baggage, and you're usually going to do your own wondering about where the bathroom is. On some parts of your hop the plane you use may have crude facilities. Sometimes not.

YOU do not start on one of these trips nonchalantly, as Americans gadded abroad of yore. If you happen to be a civilian, you go through a series of negotiations, clearances, investigations, vaccinations, and preparations in general which certainly need days and may take weeks.

Once you leave America and arrive at a foreign base you are accepted almost without question. You have entered the charmed circle of those with established credentials. You can thereafter hop aboard almost any plane that has a vacant place not sought by a passenger with a higher priority; you can, if your papers permit, practically hitchhike from air base to air base around the world. Even privates in the war theatres can sometimes grab a ride

Mrs. Roosevelt alighting from the Liberator that carried her on a 23,000 mile tour of our Pacific bases.

from post to post, if a pilot gives the nod. But one's first departure from native shores is a major problem in formalities.

If you are well advised — and you will be — you discuss neither your destination nor your possible time of departure. Your destination is X, and even you are not told your route there. It may lead through tropic climes; it may carry you over northern seas. The time of your departure is not made known to you until almost the last hour. You will leave veiled in the silence and mystery of an Oppenheim hero.

Thus a passenger, once cleared, is merely instructed to hold himself in readiness, over a period of days, for a telephone call. That call, when it comes, instructs one to proceed to a certain place. It may be an airport; it may possibly be just another city near an airport, where a second call is to be awaited. You are informed of the field where you are to take your plane only a few hours before the start of the flight.

How one is to dress is a gamble. Sensitive passengers will debate cottons for tropic heat versus woolens for northern cold. They will at least be safe in remembering that whatever the route, a Liberator Express plane flies miles above the clouds, where temperatures can be icy even over the tropics.

There might be sandwiches available aboard. But a foresighted passenger carries dry rations in his carefully weighed kitbag (the weight allowance depending on one's mission and its importance). On stopovers, there is sometimes a PX (Post Exchange) at hand. And occasionally a mess hall will be in hailing distance of airplane bases. One base has even reported a soda fountain. But food on the person is a good soldierly practice.

Wherever X is, you'll probably land there carrying impressions not of a great flight, but of a bucket seat. This is an old device, familiar on farmers' ploughs, that cups the rear end of the human figure in an aluminum spoon.

There are only two ways to sit in one — you may do so erect, with head inclined to avoid the sloping wall behind you — or bent double, elbows resting on knees to support the drooping head. The bucket seat saves much space in A.T.C. express planes, when seats are provided at all — some planes offering nothing but the floor. But it has been called this war's most terrible illustration of man's inhumanity to man.

The transition to your landing is abrupt enough. You can land on our Sicilian and African bases just two days out from New York. Reaching India from New York can take less than a week, if you go straight through. (To those who remember the last war, when it often took about a week for an Englishman to reach the Hindenburg Line from Blighty, the comparison is inescapable.) Our men in Guadalcanal and Australia are only some 60 hours from San Francisco by plane, instead of almost a month by ship.

ONE thing is certain to impress you as you go — the organized airbases. If your route is over ice-bound islands, you will find airfields of steel mesh laid directly on the ice. In North Africa you will find them of oiled gravel and sand. In the jungle you may find them of treated clay or of gleaming concrete. Our A.T.C. has literally put a necklace of them around the world.

You can, if your papers permit, practically hitchhike from base to base around the world."

General Arnold steps off his Liberator Express.

If you fall into conversation with a General in the next seat, he won't tell you the number of bases we have, nor even their location. But he can tell you how the global figures are reflected in known data on our domestic operations. Here at home we have increased the number of our important airfields from under 100 in 1940 to almost 400 this year — their importance being measured by all having paved runways of 5,000 feet or more. In the Western Hemisphere alone the A.T.C. is flying a million tons of cargo each week, a traffic that is roughly estimated at about one half the total on the A.T.C. world routes.

If the friendly General cared to talk logistics to you, he could point out that this volume of airlane freight, impressive as it sounds, has an importance far outweighing its size. For only emergency shipments travel by air. Wartime airfreight, just like wartime air passengers, consists only of the key factors required to permit all the others to function adequately.

It is not all one-way freight to our fronts. The General could tell you of cargoes of platinum brought home from the Persian Gulf, quartz crystals and industrial diamonds from South Africa, hog bristles and silk for parachutes from China, light balsa wood from South America to make P.T. boats and gliders. Recently, in less than a month, the A.T.C. flew in 110,000 pounds of *Cube,* a vital ingredient needed from South America for an insecticide used to protect some food crops in our Northwest.

Almost all of this service has been an emergency creation. The Liberator Express, for instance, was originally designed as a long range bomber. The modified ship has been used in greater number than any other plane for long distance transport simply because the design had proved itself — and facilities were ready for turning out the Liberator Express planes in incomparable volume, without interfering with scheduled production of Liberator bombers. When the needs of the service permit changeovers, Consolidated Vultee has an even finer express plane ready for volume production.

If your wartime routing leads you across the Pacific, where Consairway is operating a service under A.T.C. auspices, or to India, where we are preparing for our Burma drive to the heart of Japan, you will find Liberators used almost exclusively on the long hauls. This is because of their unexampled range when carrying a heavy load. In the Far East, where distances are incredibly vaster than in Europe, only planes of maximum range can do the job.

Because of this you will probably be making most of your long overwater hops in Liberators; on the way from base to base you will likely as not ride such superb planes as the Douglas DC-3 and DC-4, the Lockheed 18, and the C-47 made by Curtiss-Wright, among many other fine transports.

If you are making a circle swing, you are bound to get back to the United States with one firmly rooted conviction: the development of our American air arm has almost outstripped our ability to think about its implications. Said one man who was in New York the same week he had been under German bombs and shell fire at Palermo:

"My mind knows it's true. Here I am, and Tuesday I was there. Yet, it is still incredible. We are only men, and we suddenly are given the wings of gods."

Educating Lt. Walker

Pilots must master all radio fundamentals.

Studying the E-6B Computer in navigation.

(Below) Learning war aircraft identification.

AN EMBRYO LIBERATOR PILOT WORKS TERRIFICALLY

AFTER nine weeks at the Fort Worth Army Air Field, student officer graduates get a small scroll. There are no speeches or formalities. The scroll states simply that the officer has satisfactorily completed his course in Consolidated B-24 Liberator "first pilot" training. That little certificate stands for a lot of work, and an education that has cost the nation thousands of dollars.

Instructors say anybody who can fly an airplane can fly the Liberator. But learning to fly the B-24 is actually only a part of the Training Command's B-24 "pilot transition" course. This explains why freshly commissioned flight officers and seasoned lieutenant colonels alike need nine weeks of highly concentrated post-graduate study.

New student officers pouring into Fort Worth every four and one-half weeks are given three hours merely to look a Liberator over, after being given a list of its parts covering six typewritten pages.

Detailed knowledge of the ship's many systems and mechanisms are considered by the Training Command to be of greatest importance for "first pilots" who will command combat crews on bombing missions.

As first pilots, these flyers must know their craft from the simplest pre-takeoff procedure to the most complicated details of navigation and mechanical repair. In addition, they must understand the essentials of the job done by every man under their command — the co-pilot, navigator, bombardier, aerial engineer, radio operator and three gunners.

This is an undertaking of big proportions. Students put in an eighteen hour work day throughout the course.

How does a student spend that time? Suppose we follow a typical student officer from the time he reports for duty until he receives his first pilot's certificate of proficiency.

Meet, then, Lt. Leighton Walker, of Houston, Texas. He is a young flyer of 24 who won his wings and commission at Lubbock Army Flying School. Shortly after graduating from Lubbock, Lt. Walker received his orders to report to Fort Worth.

Arriving at the big base, Lt. Walker reports to the commandant of the student training detachment, and immediately goes into two days of "processing." He fills out, as one student has described it, "four-and-a-half hours of forms." These cover his life history.

Then he reports to the station hospital flight surgeon for a physical checkup.

Lt. Walker now is assigned to a group and squadron. If he has any ideas about having considerable freedom now that he is an officer instead of a cadet, he is quickly disillusioned. He meets his instructor, and strolls together with several other students to the flying line, for his first formal introduction to the sky-giant he will soon be flying into battle.

His first glimpse of the gadget-packed

strument panel of a Liberator, a plane ght times the weight of the largest ship udent pilot has ever flown before, is nd to seem staggering. But all essential ctions of the bomber are carefully ex- ined to him. He then takes his first flight. goes as observer. Students do not solo 3-24 until they have had 45 or more hours observation and flying time in the co- ot seat.

T WALKER thereafter gets up about 5:30 o'clock every morning, has breakfast, is out on the flying line, ready to go, at 30. He flies from 6:30 until noon. He oots repeated landings; becomes familiar th the long check list which must be ac- plished many times before and during ery flight; learns crew distribution; be- mes familiar with the ship's many instru- ents; learns the use of the ship's intricate dio system, its warning bell system, prop thering and unfeathering, operation of -icers and anti-icers, emergency landing r operation and a host of other pro- dures.

Blind flying check-up in Link trainer.

Emergency bomb release is learned.

After lunch, from 1:30 o'clock until 5 p.m., Lt. Walker works in Ground School and in the engineering shop. There he delves into navigation, radio, meteorology and weather study, aircraft and surface ship identification, first aid, code review and signal lamps, and chemical warfare defense.

At the engineering shop he puts on work clothes, and studies the B-24's maintenance and mechanical problems.

At 5 o'clock Lt. Walker's day is still far from done. He reports from Ground School to the Student officer area for 45 minutes of physical exercise. After dinner he is ready for an hour of radio code practice. At 8 o'clock he goes to the Link Trainer School, where he acquires instrument time. An hour of that, and Lt. Walker is ready to return to the barracks — to study for his next day's ground school classes. He gets to bed about 11 o'clock.

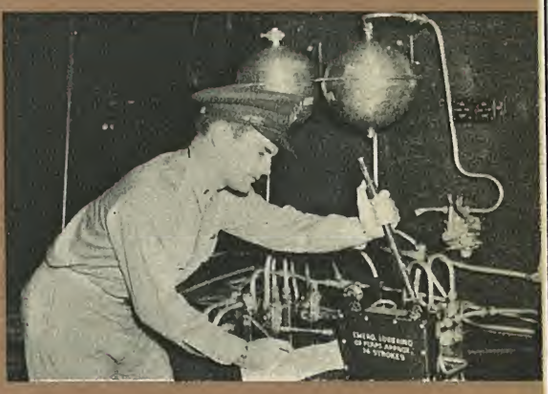
By the third week, Lt. Walker is doing some night flying, getting ready for his first cross country and altitude flights. He takes his first night X-C, or cross country, during his fifth week. His 30,000 foot altitude flight with full oxygen equipment comes during his sixth.

By his seventh week he is accumulating solo hours and making long flights to distant parts of the country. On these flights students make all their own preparations, chart their own course, select their landing fields, and put to actual practice all the many subjects they have been studying aloft and on the ground. Lt. Walker and his co-pilot, who work as a team throughout their course, must know what to do when their instructor suddenly shuts off some vital function of the plane. To make these flights even more difficult, commanders often schedule them under the most trying of weather conditions. During the ninth and final week, Lt. Walker is flying close formations of the type employed on combat bombing missions.

After graduation he goes on to an Operational Training Unit, where he meets the crew he will command in theatres of operation, and completes with them the final phase of his training.

From there it's overseas and into combat in a fully outfitted B-24, with an education that has cost the nation around $30,000, and a crew that is a fighting team and raring to go.

Ship identification must be learned, too.

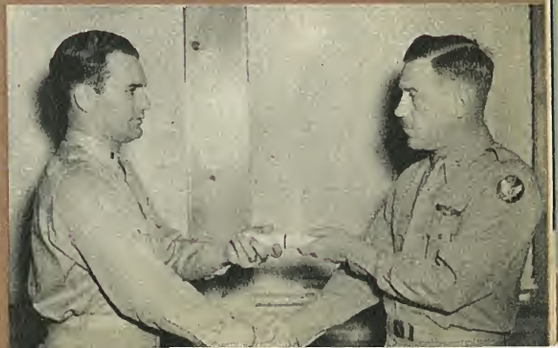


Studying lowering of flaps on a "mock-up."

Daily routine includes physical training.

All kinds of formation flying are learned.

(Below) Receiving his training certificate.



JUST A *Wonderful guy*

The story of Edward A. Stinson's aviation pioneering holds some fabulous chapters. A few highlights are told here by his partner, Bill Mara, now on the staff of Consolidated Vultee's Stinson Division.

By WILLIAM A. MARA

EDDIE STINSON, whose work made a lot of the aviation history back of today's American airpower, was not what you would call a scholar. When you add him all up, Eddie was just a wonderful guy.

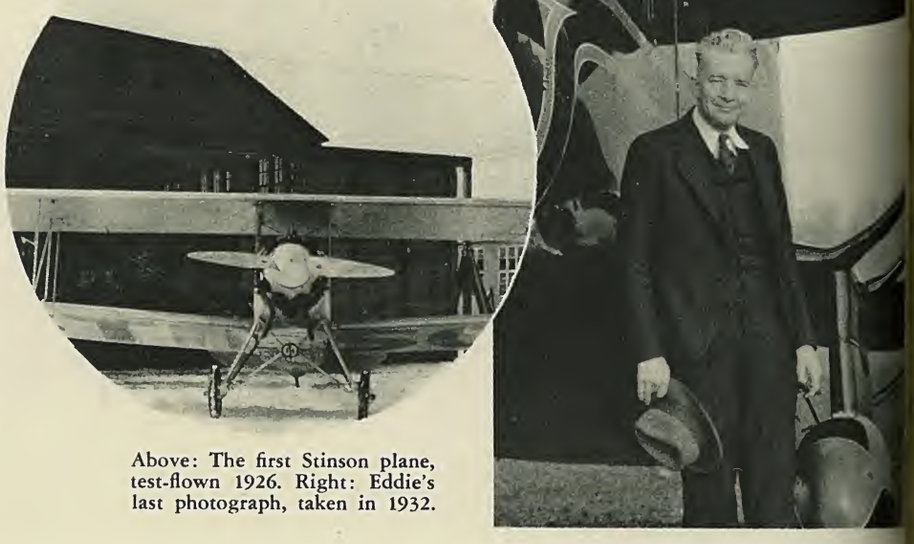
Eddie invented the first brakes ever used on airplane wheels. But he was far from being interested in their historical implications. Eddie wanted to be a little more of a grandstand draw.

He was seventeen then, and he was packing 'em in at County Fairs with his fifteen-minute flights. He got an average of $1500 for that fifteen minutes, and he was worth it, so far as the gate was concerned. But Eddie wanted to raise the ante, and wondered how he could get $1750 a show. He figured that he would be worth an extra $250, if he could devise a way to stop his plane right in front of the grandstand, before the cheering crowds. Airplanes were still a big curiosity; people wanted to see them close up.

So Eddie devised the brakes to enable him to pull up right in front of the paying customers. And he got his extra $250.

His parking brakes, the first known, were devised about as impulsively. Eddie had flown up to northern Michigan with a friend of his named Harold Keene.

When stopping at Flint for gas, they had an adventure. Something proved wrong with the electric starter, and Eddie decided to start the motor by pulling the propeller through by hand. He told Harold to sit in the plane and open the throttle very little. But when the motor started, Harold opened wide up instead, and the airplane started down the field. Eddie jumped out of the way in time to save his life; but there was a hotdog stand ahead that couldn't jump. The propeller at 1650 r.p.m. churned hot dogs, mustard, buns, and pop into a broth before Harold recovered sufficiently to cut off the ignition. The damages, including the cost of a new propeller, were not inconsiderable.



Above: The first Stinson plane, test-flown 1926. Right: Eddie's last photograph, taken in 1932.

As a result, Eddie devised parking brakes.

His conquest of the tail spin likewise grew out of very personal experience. He was operating a flying school on the parade ground at Ft. Sam Houston in San Antonio. Business was good, and he was raking in the dollars. He built his airplanes himself.

About this time the Army received its first airplanes, and Lieutenant Foulois (later to become General Foulois, in charge of the Army Air Service) asked Eddie to stay on the ground while the Army planes were in the air. The Lieutenant feared collisions. At all other times freedom of the air would prevail.

Independent as always, Eddie refused the qualified freedom and sought out a new flying field nearby; it later became Stinson Field, the Municipal Airport of San Antonio. There he managed to get hold of one of the first 8-cylinder, 50-horsepower Curtiss motors. Eddie built a new airplane around the motor, streamlined the wing struts — a novel idea at the time — and took to the skies to see how much speed he could get out of the new concoction.

It had "high performance" for those days; it would fly at almost 60 miles an hour. Eddie was delighted. But one day he took the plane to its maximum ceiling of 6,000 feet and suddenly found himself in the deadly tailspin.

Eddie tried his best to get out. The plane only spun the faster. The tailspin in those days was like the traditional bite of the cobra; there was supposed to be no recovery. Close to the ground, by now he had given up all hope; he had tried all the tricks he knew, and none of them worked. He was undoubtedly a goner. Might as well get it over with as soon as possible, he thought. So he pushed the control stick forward. He thought this would just make the plane dive the faster. All theory coincided on that point. But instead of continuing its dive, the plane suddenly came out of the spin while still just a few feet above the ground.

EDDIE was dizzy and nauseated from the spinning. So instead of landing immediately, he flew around for a few minutes to clear his head. Meanwhile, he began to think things over. Clearly, instead of diving faster when he pushed the stick forward, the plane had come out of the spin.

Then the way to get out of a spin must be to push the stick forward. The idea seemed crazy. For when a plane is going nose downward, the obvious way to recover would be to pull back on the stick — the operation normally used to raise the nose of a plane and make it climb.

But there was only one way to resolve the conflict between experience and common sense. That was to put the question to the test. Without landing, Eddie climbed again to the maximum ceiling for his plane. Planes were so unstable in those days that, almost at once, he was spinning again. Eddie pushed forward on the stick. Immediately the ship came out of the spin. He knew then that he had licked the spin, which had licked all others because they had done the obvious thing.

Thereafter Eddie had the time of his life. For good, clean fun he would go up every morning and practise spins, and the word spread. Audiences gathered, and soon Lieutenant Foulois and his young air force were among the audience. No one ever came out of spins, but here was a kid who did.

The Lieutenant told Washington, and asked permission to take lessons. The okay came and Foulois approached Eddie.

"Will you teach us to get out of spins?"

"Sure."

"Very well. But we'd rather not fly in these old crates of yours. Will you teach us in our own Army planes?"

"Sure."

"Very well, then. Report at our field at Fort Sam Houston tomorrow morning at nine o'clock, and we'll begin the lessons."

"Not a chance," said the redoubtable Eddie. "You fellows thought I wasn't good enough to fly off your field with you a few months ago. Bring your planes to my airport, and I'll instruct you here." And that's what happened.

In later years, when Eddie did some settling down and put capital to work building planes at the Stinson Aircraft Corporation in Detroit, he had carefully reasoned out the theory of inherent stability. The first plane the new corporation built in 1926 was so designed that it would not get into a tailspin accidentally, and soon all such spins were a thing of the past. Today planes are built inherently stable — they will fly indefinitely with hands and feet off the controls. Even if pulled up in a hard stall or climb, with the nose pointing skyward and the power shut off, a plane nowadays will not spin, as in those early days — it merely noses over, levels off, and assumes a normal gliding angle without assistance from the pilot.

Such advances in our knowledge are owed to the gallant adventuring of men like Eddie Stinson.

Eddie was a great adventurer, but he doubtless never thought of himself as brave. The first non-stop night flight he

Today's newest Stinson plane, the L-5 "Flying Jeep," shown on liaison duty with M-4 tanks.

Old picture showing first Stinson plane built for Northwest Airlines, with (left to right) Ray Collins, Edward A. Stinson, W. A. Mara, and Colonel Brittin, then President of the Airlines.

made between Chicago and New York — the first anyone had made — illustrates his approach to things.

It was in 1922, and Eddie needed money in a hurry. He had just used all his available cash to buy a slightly used German Junkers seven-passenger monoplane from the Navy Department.

Scratching his head, he recalled an old friend, the late Charles Dickinson, a wealthy grain man of Chicago who had reached the Biblical limit of three score and ten, and still was full of all the zests. He was, for instance, a great flying fan.

Stinson had heard him say he'd like to be the first passenger to fly at night between Chicago and New York without stopping.

Eddie had no great passion for such a flight. He knew the risks. But how he needed the money! He called Mr. Dickinson long distance from Philadelphia.

Mr. Dickinson was enthusiastic. "How much will it cost?"

Eddie did some quick thinking. He had put in the call without much enthusiasm of his own, and the more he thought about the things that could happen on that long night flight the less the idea appealed to him. He decided to double the price he originally had had in mind.

It is worth explaining that Eddie's original prices were never low.

Legend says that when Mr. Dickinson heard the quotation over the wire, he almost died of apoplexy, after screaming something into the telephone about highway robbery. But he did want to make that flight. And so he recovered himself sufficiently to say over the phone that he would at least consider the matter, and in the meantime Eddie was to fly on to Chicago. If Dickinson found he could agree to the price, then they'd fly that night. Eddie agreed, and took off for Chicago.

The nearer he got, the less that long night flight seemed to appeal to him. He decided to make another try at getting out of it. He would double the last price he had quoted — meaning, in effect, a quadrupling of the price he first meant to propose. That would certainly make him a free man.

Having made up his mind, he felt better; and so was rather nonchalant when he got to Chicago and Dickinson met him at Chicago field. Eddie simply said he'd been thinking the matter over, and decided he couldn't do the job for less than double the money he had last mentioned. Mr. Dickinson is supposed to have screamed murder. But he did want to make that flight. And here he was at the Field. He finally told Eddie he'd lay the money on the line.

Eddie was flabbergasted. But he couldn't say anything now. The flight was scheduled for the same night. He hoped the weather would be bad. He hoped it would blow a cyclone. But night fell, and the weather was fine.

Mr. Dickinson climbed in — he had the enclosed five-passenger cabin all to himself. Eddie sat in the front cockpit. It was a bright moonlight night and they took off under idyllic circumstances, with fair weather all the way to Toledo. Then the moon went down. Eddie thereafter had to guess his position by compass and the lights of the towns. Then the lights of the towns went out. And soon the motor began to pound roughly. And mists came up. And Eddie sat sweating in his cockpit, hoping against hope. Then Long Island Sound was reached, just as dawn was breaking. Eddie settled down on Roosevelt Field for a three-point landing, and the first non-stop night-flight between Chicago and New York was an accomplished fact.

Mr. Dickinson was enthusiastic. He clapped Eddie on the back. "Son, you've made a great flight, and you must be awfully tired. Now, I've been a prohibitionist all my life. But if you'll come across the street I'll make an exception for once and buy you a drink. Maybe you need it."

"Sorry, Mr. Dickinson," Eddie replied. "I just finished off a bottle of gin while we were over the Sound."

Eddie Stinson had a full life. Born in Alabama in 1894, he was a small-town boy who lived to the hilt what historians may call the golden age of American enterprise.

He became a great mechanic as well as a great flyer. Once, when a bolt that served as a pilot for his elevator controls sheared off, he landed in a cemetery. When the sexton appeared, Eddie was busy wondering where he could get a bolt. The interested sexton suggested that if Eddie were really in need, a bolt might possibly be pried out of an ancient iron-plate coffin fairly studded with bolts, that occupied a nearby vault. Together, the two rolled back the stone; a bolt of exactly the right size was located; and Eddie repaired his plane, took off successfully after pushing the plane to a nearby field, and made a fine landing at the airport.

Having built crates since he was a boy, Eddie became by the early twenties one of the nation's finest aircraft designers.

He had never gotten across to France in the war — something he had always regretted; he was too valuable as an instructor, and had been kept at Kelly Field.

By 1925 Eddie had developed plans for an entirely new type of airplane. A syndicate of Detroit financiers was formed to back him, and in 1926 production started.

Stinson planes soon took their rank among the most famous of sporty, fast comfortable light planes available to the young generation discovering the delights of flight. Flying his new planes, Eddie won trophies almost every year, while his planes won over customers and made records. One of the planes was the first to fly under its own power to Tokio. On the basis of his safety record, Eddie commanded the lowest insurance rate accorded any airman in the United States.

It was ironical that he should die in an airplane crash at Chicago, in January 1932. But it was death as Eddie doubtless would have wished it. He left literally thousands of personal friends among the Who's Who of Aviation, and a name that is as significant today as when Eddie was alive to put it in the headlines.

What's Chungking doing in Nevada?

THIS, YOU WILL SAY, is a strange-looking map of the U.S.A.

There's Chungking, China, right where you'd expect to find Elko, Nevada.

But we put it there to remind you that you can fly from Chicago to Chungking in 39 hours' elapsed time — about the same time it takes to travel from Chicago to Elko, Nevada, by train.

And that's why we put Moscow, Russia, where San Antonio, Texas, ought to be—and Singapore up near Seattle, Washington.

The number of hours shown over each of these foreign cities represents the elapsed time by air from Chicago to that foreign city. Its location on the map shows the approximate distance you could travel in the U.S. by train in the same length of time.

Perhaps you hadn't thought of the world as being so small. But it is. Today, because of the long-range plane, *no spot on earth is more than 60 hours' flying time from your local airport.*

No longer, in a world shrunk so small, can there be such a thing as a hermit nation. Not when the Atlantic can be spanned in 372 minutes, and the broad Pacific in only 35 hours.

As a nation, we didn't fully understand this, at first. But when we did become aware of it, we quickly recognized the need for speeding the production of vast numbers of military aircraft, and training the personnel to fly, fight, and maintain them.

This has been done — is still being done. And mastery of the air — which was not ours to begin with — is now helping to change the once-desperate hope of ultimate victory into a certainty.

After Victory, when we set about the task of *securing* our freedom and a lasting peace, the plane will take its rightful place as a tremendously *constructive* force, welding the peoples of the earth together in friendly trade and intercourse and mutual understanding.

CONSOLIDATED VULTEE AIRCRAFT CORPORATION operates 11 different plants, located as follows: San Diego, Calif.; Vultee Field, Calif.; Fort Worth, Texas; New Orleans, La.; Nashville, Tenn.; Wayne, Mich.; Allentown, Pa.; Tucson, Ariz.; Elizabeth City, N. C.; Louisville, Ky.; and Miami, Fla. *Member, Aircraft War Production Council.*

CONSOLIDATED VULTEE AIRCRAFT

DESIGNERS AND BUILDERS OF:

LIBERATOR	4-engine bomber	CATALINA	patrol bomber	VALIANT	basic trainer
CORONADO	patrol bomber	LIBERATOR EXPRESS	transport	VENGEANCE	dive bomber
SENTINEL	"Flying Jeep"	RELIANT	navigational trainer		

From an advertisement of the Consolidated Vultee Aircraft Corporation

Tom M. C

Plane Talk

JANUARY · 1944

Cover in the Desert by Ivan Dmitri

SAN DIEGO PUBLIC LIBRARY

Tom M. Girdler · Ivan Dmitri · Adm. William V. Pratt · William E. Barrett · Lt. Col. Robert H. Parham

Plane Talk

If you wish to share your copy of Plane Talk when you are through reading it, you may send it to a friend for 6¢. The simplest way of mailing is to slit a business-size envelope at both ends, roll up the magazine in it, seal and address and put on 6¢ in stamps.

JANUARY, 1944 • CONTENTS • VOL. II, No. 1

PUBLISHED BY CONSOLIDATED VULTEE AIRCRAFT CORPORATION

The Cover Pictures

Above and below you see close-ups of Ivan Dmitri, distinguished photographer and Saturday Evening Post *correspondent, who is himself seldom photographed. These snapshots show him in Africa on a recent mission for the Air Transport Command, which carried him through several war theatres.*

Born in Centerville, S. Dakota, in 1900, and an alumnus of the University of Minnesota, Dmitri is a direct descendant of one of America's greatest portrait painters, Benjamin West.

Both front and back covers reproduce Dmitri kodachromes of Liberators in the Middle East. You will find more Dmitri pictures in his report from the Mediterranean theatre, beginning on page 16.

Speaking of Progress
Tom M. Girdler, Chairman of Consolidated Vultee, makes a summary . 1

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Men go out from San Diego to help the Air Forces all over the world.... 3

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SPEAKING of PROGRESS~

Do you know how efficient our plane building program really is—and how this efficiency is measured? Here are the facts on Consolidated Vultee by an authority—the Chairman of the Corporation's Board of Directors.

By TOM M. GIRDLER

THE major job of the aircraft manufacturing industry since the war began can be described in simple terms. It has been to produce thousands of planes instead of dozens. Fine airplane designs, which America already had abundantly in 1941, do not in themselves constitute airpower. Such designs must be translated into thousands of planes in flight.

To help speed that wholesale translation was our assignment at Consolidated Vultee, and everything we have done has had this one purpose. When we merged two companies, or "broke down" jobs to enable workers to handle them readily, or developed new materials for plane building, or devised new methods of worker training, or did a thousand and one other things, we were acting with just one final object — to produce more airpower in less time.

In writing about the results the figures of greatest interest cannot be given — the number of planes we have built. For our enemies also want that significant information. So we must speak in other words, like *total pounds* of airplanes. (Since Consolidated Vultee makes eight kinds, from Liberator bombers and express planes down to Vultee trainers and Stinson flying jeeps, the enemy can't convert such totals.)

In the year of 1942, Consolidated Vultee delivered around 53 million pounds of planes, including spares. In 1943, we multiplied this almost 2½ times; we made a total of well over 126 million pounds of planes.

We have made our production goals largely because of a steady increase of operating efficiency. This has been achieved in various ways. For one thing, we put back of each worker more mechanical power, better machines, to aid him.

One way to measure this is by increased electric power used. Thus in San Diego — just one division — electrical consumption was increased from 35 million kilowatt hours, in 1941, to 85 million in 1942, and then to approximately 100 million kilowatt hours in 1943. In this last year there was an actual decrease in the number of production workers in the plant.

To be specific, the number of production workers at San Diego declined about 17 per cent during 1943, over the previous year. But total pounds of airplanes we produced there were doubled. The pounds produced *per employee* were increased at an even greater rate, month by month.

The monthly figures show progress even more graphically than yearly comparisons.

For instance, in the San Diego plant, in the first month of the war the average employee produced 24 pounds of airplane. By October of 1943 he was producing 155 pounds per month. His efficiency had been multiplied over six times.

WHEN compared with national averages for heavy bomber output, the production figures for Consolidated Vultee are even more striking. The WPB compiles comparisons for all aircraft plants in terms of pounds of planes produced per man per day. It reported a national daily average of 4.8 pounds of plane per man, for the three months ending October, in all plants producing heavy bombers. The figure for Consolidated Vultee's San Diego plant was almost twice as high; the WPB report put it at 8.3 pounds.

The result of all this is that man-hours needed at San Diego to produce Liberators have decreased constantly.

At the end of 1940, Liberator bombers (which then were produced in very limited quantities) each required labor of 100 direct workers working one year. At the end of 1941 the figure fell to 35; at the end of 1942 to 12. At present it is *seven,* and the ratio is still improving.

In other words, we are now producing 14 Liberators for the same direct labor that built only one three years ago.

The record of efficiency in the San Diego

Division, which makes heavy bombers, is being matched in other divisions with different products. Thus, in the months following June of 1943, the San Diego Division was rated first by the WPB in the heavy bomber classification; the Nashville plant was rated first among manufacturers of single-engine bombers; and the Vultee Field Division was rated first among manufacturers in the classification for basic or advanced trainers and utility transport planes. Second in this same classification came our Stinson Division in the ratings after July.

In behalf of management's work in these difficult times, it is worth noting that this efficiency record has been built without the peacetime advantages of a stabilized corps of workers. For the draft and other wartime conditions have resulted in a too-large rate of employee turnover.

Some of this is reflected in the fact that, in less than three years, our various divisions registered 131,648 persons who had completed training courses. The period covered is from the inception of our training programs at the various divisions in 1941-2, down to October 1, 1943. The total of trainees is considerably larger than our total number of workers — indicating the size of our turnover problem. The courses have ranged from those for sheet metal workers to training for highly skilled engineering jobs. These figures do not include courses for 12,000 members of the armed forces who were trained in servicing and maintaining the planes we make.

To help in the problem of obtaining the workers required, Consolidated Vultee has pioneered in establishing "feeder plants" in various small communities beyond our plant town areas. This reverses the usual employee operation; it brings the work to the source of labor supply. Forty per cent of the personnel at these "feeder plants" have never worked in a factory before.

It is worth noting, in this connection, that we are also using the skills of sub-contractors in communities all over the country. Thousands of vendors supply us with material. Some 6,000 such sub-contractors and suppliers are helping us.

We have had to be as ingenious in getting materials as in securing qualified workers.

As you doubtless know, Consolidated Vultee is given top priorities on materials. But, because of scarcities, materials are "allocated" even among manufacturers with top priorities. So we have had to battle constantly with the problem of getting material allocations. We have met this partly by developing new materials — not necessarily to be called substitutes, for in many instances the new are actually better than the old.

For instance, we are now making some plastic tools and dies. Until recently these had to be made from heavy metals; then, following their rough casting, highly skilled mechanics had to finish them, and machine them for precision contours.

Today we are using semi-skilled girls to pour plastics into moulds to make these tools and dies, which come out as high precision products. Some of these dies have actually been subjected to pressures of 16,000 pounds per square inch. The whole process has been called as simple as baking a cake. The resulting tools are one seventh the weight of metal ones, and much easier for workers to handle. In getting such results, it should of course be noted that highly skilled mechanics have prepared the moulds for the unskilled workers.

The list of such remarkable developments could be extended almost indefinitely. The net sum of all of them is that by taking nothing for granted, we have been steadily developing materials and processes that are at once better and easier, because they eliminate hand labor.

We have, for instance, a new process of copper brazing together steel parts — it replaces hand welding. We haven't managed to eliminate the need for millions of rivets — but we do now have a new process for countersinking rivets with machinery, instead of by hand.

We have installed countless improvements in operation to speed up the flow of materials to and from the worker; have matched our wits against necessity in every corner of our organization; are getting improved results each month that can be demonstrated in statistics.

None of the developments could have been translated in so short a time into the huge volume of planes that flows daily off our production lines unless—when the new Consolidated Vultee management came in at the beginning of 1942 — there had been a fine organization already in existence there. It was rich in talented men, both at Consolidated and Vultee.

There has been abroad some public misapprehension on this point. Some still have an idea that America's aircraft industry was a backward institution up until the time of Pearl Harbor.

Nothing could be further from the truth. Consolidated, for example, already had in production two great planes which were to prove outstanding mainstays of our armed forces in the war. Vultee Field, which in December of 1943 saw its 10,000th trainer plane come off the line, was already in pre-war times rated at the top in efficiency. The merging of these organizations, begun in 1942 and made formally effective in March of 1943, only heightened efficiencies already established in their operation.

The fact is that the major pre-war need of the industry was a volume of orders that would enable it to do a job. No industry whatever can produce at 100 per cent efficiency if its product is manufactured only a dozen lots.

That is one of the lessons for our post-war future which I hope the nation will not forget.

Today, of course, the Army is taking every Liberator we have the capacity to make. Previous figures given were by calendar years; here are our sales of all planes by fiscal years ending November 30th. In 1941 the total for Consolidated and Vultee together was $129,500,000; in 1942 it was $413,700,000; for 1943, final reckonings for the merged companies will double to show a total exceeding $750,000,000. That is, it has risen to three-quarters of a billion dollars in giant steps.

Those "sales" stand for just one thing. The value of planes handed over to our armed forces to do the job our men required of them. The 1943 dollar totals would be even greater had not price reductions been made in the cost of our planes to the Government, as a result of economies effected in our operations.

In our work back of the lines, our 100,000 men and women of the 13 Consolidated Vultee divisions — from San Diego to Miami — are supporting the men on our war fronts with every ounce of energy, ingenuity and will that we know how to exert.

FOREIGN SERVICE

How Consolidated Vultee has a corps of service men scattered all over the world, helping the Air Forces to "keep 'em flying."

AAF Photo

INTO Consolidated Vultee's office overlooking Smith Square in London comes a call from the British Air Ministry asking for a representative to confer.

At an Italian base, a field technician learns that he must help groom Liberators for another mission over Germany.

In India, a foreign representative crawls sleepily out of a laced bamboo hut at 4:00 a.m., stirs into another day's activity at a bomber base ten airline minutes from the Jap lines.

Down in Rio de Janeiro, a request in Portuguese comes over the telephone for a field technician to help with a service problem at a distant air field.

So goes the routine for foreign representatives of Consolidated Vultee in Alaska, China, Africa, Europe, and many an obscure outpost. They are field technicians, helping maintain thousands of Consolidated Vultee planes in operation, and guiding air force ground crews in servicing their aircraft. The ideal is to have at least one Consolidated Vultee technician available at each major base to assist military personnel. The number of the Company's personnel abroad is a military secret. Their technical knowledge is a big factor in keeping combat aircraft in the skies. Their experiences rival those of some combat personnel.

When ground crews worked swiftly in the African desert to get scores of Liberator bombers ready for the Ploesti mission, Victor J. Genereux was there for Consolidated Vultee.

"We worked 24 hours a day sometimes," he says. "As the zero hour approached — we knew it was near because of the beehive activity around headquarters — one bomber named 'Tag-A-Long' had an engine that sounded like a bucket of bolts were being jostled around inside. First we changed a couple of cylinders hoping that would fix it up. But it just sounded like we had poured two more quarts of bolts in. I looked at the sweaty crew standing dejectedly around.

" 'Maybe we've got time to change the engine,' one of them suggested. 'Let's go!' others shouted.

"A hoist was wheeled up, tools flew into action and by ten o'clock that night — the night before the raid — we had it changed. 'Tag-A-Long' went along."

The losses on the raid were large. Most ships that did return were damaged. Many of the returning bombers landed at alternate airports, so Genereux had to travel from one base to another to help supervise ground crews getting them back into shape.

He tells of a Liberator returning from another raid which landed several hundred miles short of its home base. Over the target, flak had struck the hydraulic system and completely wrecked it, leaving the bomber without flaps or brakes. As the pilot approached an emergency landing strip, the crew managed to lower the landing gear by mechanical means. A good landing was made. But without flaps and brakes the plane rolled at an initial speed of 100 miles an hour and stopped far out in the sand.

"I was located 350 miles away," Genereux says. "But they called me to look it over. I flew down in another Liberator, inspected the damage, decided it could be repaired. So we flew back, gathered up all the hydraulic tubing we could find, took four ground mechanics back with us. The plane was only a half hour's flying time from the German lines. We worked all day splicing hydraulic lines. There were gaping holes in the wings and fuselage, so we cut up gallon gasoline cans to patch them. When darkness fell on the desert we were about half through; we worked all night by flashlights. German planes were flying overhead, so we had to be careful to shield our light when working on the outside. Early the next day we got the bomber in shape and took off before the German planes spotted it."

One of the biggest jobs in this foreign maintenance of planes is swapping parts. Says Genereux: "I've traveled over 40,000 miles getting parts to patch up Liberators. Once I flew in a 1929 British fighter with-

Repairs being made on wing of Jap-damaged Liberator by men at Carney Field, on Guadalcanal.

AAF Photo

out instruments to salvage parts from a wrecked plane.

"We use B-24's, C-47's and B-25's almost indiscriminately in making swapping deals. Despite the difficulties of getting spare parts, ground crews keep most of the Liberators in fighting condition all the time. The Liberators at one base, for instance, made 10 bombing missions in 11 days. That's a tribute to the ground crews as well as the planes."

FIELD technicians bound for foreign duty are carefully selected personnel. The average representative sent overseas or to South American countries is a composite individual. He must be engineer, mechanic, pilot, good-will ambassador and non-combatant soldier, all rolled into one. Some hold engineering degrees; others are well known test and transport pilots with a library of log books; a large number have A.&E. licenses; and all of them are self-reliant, aeronautical specialists.

Gil Clark, who is stationed in South America, could run an adding machine tape on his log books and get a total of over 6,700 hours he has spent in the air. Once he was a pilot for Western Air Express; later he flew transports over the Orient for China Aviation. For five years he was a test pilot for Vultee Aircraft, Inc., before being sent to Brazil as a field representative. Recently, he was named supervisor for all of South America.

William C. Black, another technician, spent six years as an aircraft and engine mechanic with the Army Air Corps and Western Air Express. He worked in the experimental department of Vultee at Downey Field and Nashville for two years. This background of experience plus an amiable personality qualified him for a foreign assignment on dive bombers. The records of other field representatives are equally impressive.

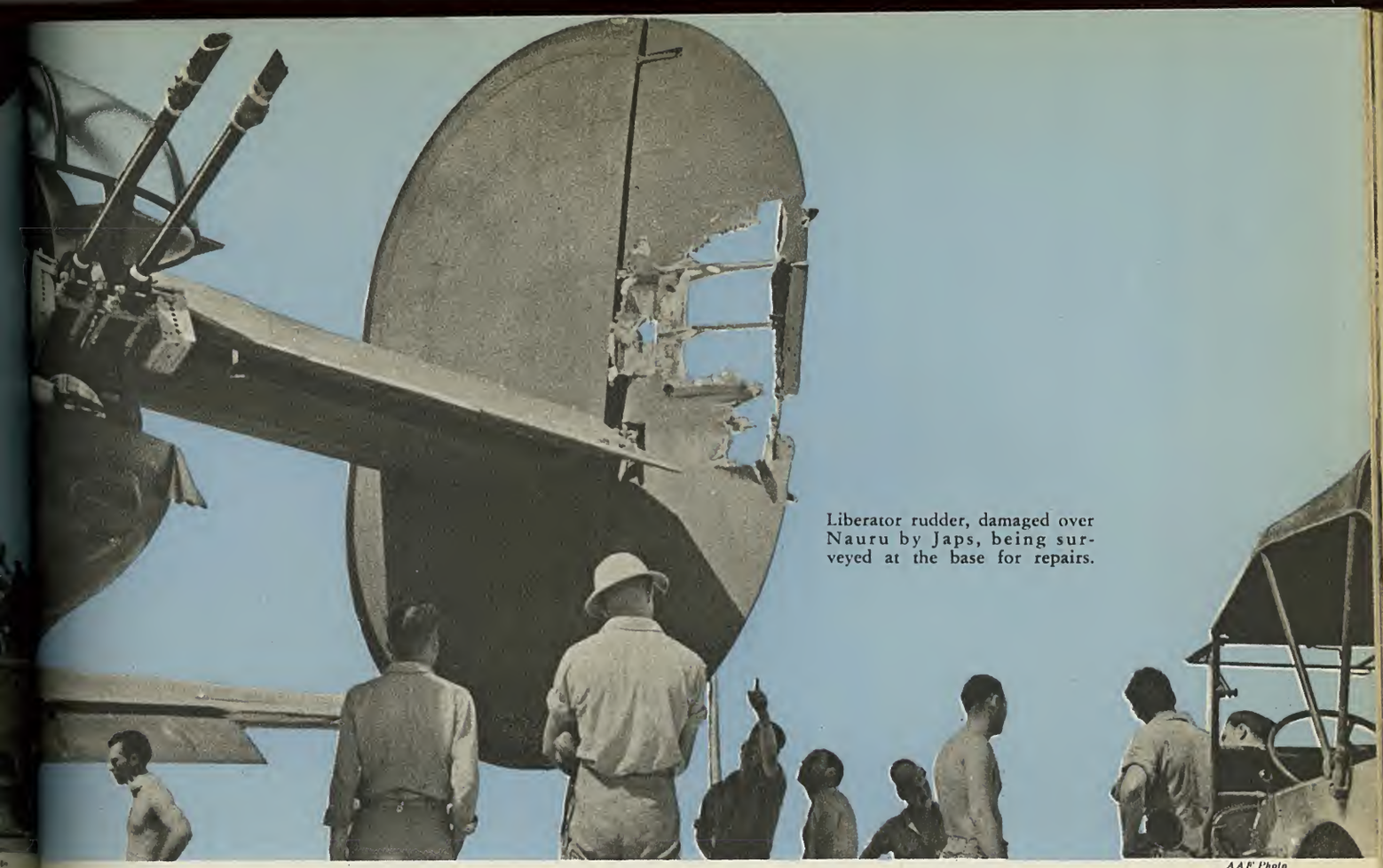
Foreign representatives are part of the corporate service department, headed by Director H. C. Tafe with headquarters in San Diego. Assistant Director O. E. Mecham supervises both field and factory service. Field service is directly administered by J. B. Misner, and factory service by W. O. Blakesley.

Overseas appointments are made from volunteers, and there is always a waiting list of home-based technicians who look forward to service near the battle fronts. About half of them are married. But when they accept a post in a foreign country, they are subject to the same restrictions about taking their families as military personnel.

If a man's recent work has not been on the particular model he is assigned to cover, such as a Liberator, Catalina or Coronado, he is given a few weeks' familiarization course at Consolidated Vultee before being sent to a base. By special arrangement with the Government, technicians assigned to Liberator B-24 bases attend a course at Camp Consair in San Diego. Here they review the latest techniques developed in servicing Liberator bombers.

A trunk full of service manuals, blueprints, charts, and pamphlets goes along with each technician — a compact aeronautical library. Daily the headquarters office in San Diego supplements this original material with reports concerning new installations, techniques, design changes and other information which may be useful for the service experts.

The men are usually flown by the Air Transport Service to their assigned bases. If they are stationed on a military base, as so many are, they are under the jurisdiction of the Air Service Commander or the Commander of a naval base. Considered civilian technicians, actually they are semi-military men, and cannot leave the area of assignment without written permission from the Base Commander. They wear an officer's uniform from which all insignia of grade



Liberator rudder, damaged over Nauru by Japs, being surveyed at the base for repairs.

AAF Photo

has been removed. If captured, they are entitled to the same treatment as military personnel captured in uniform.

When stationed at an operations base, technicians spend most of their time in the service area with ground crew chiefs, in a consultant capacity. But in emergencies they don mechanic's overalls and work with ground crews, side by side.

In London the British Air Ministry often calls for a field representative to consult on a proposed modification to one of the Company's planes. Perhaps a plane scheduled for operation in dusty India needs a new type of air filter.

If the representative is asked to be at Farnborough — "Wright Field" of England — he perhaps drives out, when a car is available and he has enough petrol coupons. Or an RAF car may whisk him off to the field. If the call happens to be to one of the more distant provincial bases, the British usually offer the use of a small personal transport plane — often a Stinson, which the British use extensively.

Down in South America are hundreds of Consolidated Vultee planes — in Brazil, Colombia, Chile, Bolivia, Peru and Paraguay. At Natal, European-bound Liberators stop at the ferry base. Catalinas cruise off South American shores seeking Axis submarines and getting their share. Giant Coronado flying boats stop over enroute to Europe. And many a Latin American youth is getting his flying training in a BT-13A basic trainer.

A high percentage of the planes in those countries are made by Consolidated Vultee, and company representatives are located at several points to cooperate with military personnel in maintaining them.

In three or four months the men learn enough Portuguese or Spanish to explain most aviation engineering problems to our South American neighbors, who incidentally make excellent pilots and mechanics.

With our 10th Air Force in India and at the Royal Air Force bases in that country, field technicians are assigned to help service Liberators, Vengeance dive bombers, and Catalina flying boats. At bases near the Jap lines, representatives live in laced bamboo huts constructed to resemble native villages.

Reports and messages from such representatives flow into the San Diego headquarters office 24 hours a day. These men make many recommendations as a result of their experiences which are important factors in the rapid progress now being made in American aircraft designs. They are doing an important job in the air-war; they are likewise doing vital work that looks toward peace.

An outgoing foreign representative, bound for New Guinea, getting instructions in San Diego.

How MODIFICATION Spells AIRPOWER

Tailoring Each Plane to Its Job

Modification, which sounds like a forbidding word, is one of the most interesting steps in building aircraft that will outwit our enemies. Consolidated Vultee has several modification centers. This tells about the work at Tucson.

Two engines were dead, and half of the tail section looked shot away. But the big bomber somehow settled to the runway and rolled to a stop. The crew piled out, and hurried off to the report room.

Thirty-six hours later details in their report were in the hands of officers of the Special Projects Branch, Material Center, Wright Field, Ohio. And Wright Field experts were in a huddle, studying changes in the B-24 which officers returned from that mission had suggested.

Less than a week afterward some of the changes requested by those fliers in North Africa were already being incorporated in new Liberators on the modification line at Tucson.

The modification center is an American answer to the swift-changing problems of today's war. Shifts in enemy tactics can be met by immediate changes in our equipment, without disrupting the flow on assembly lines at parent plants.

Some people think a modification center is just a place where planes are camouflaged for service in the special area they will fly in—made white for sea-going, greenish for the jungles, pinkish for the desert.

But actually modification means far more — it is a method of avoiding the "freezing" of designs which volume production usually requires.

Mass-production techniques applied to aircraft marked the first step in building America's airpower. But along with the aircraft assembly line came new problems. The battle fronts were producing almost daily evidence that "time makes ancient good uncouth." On automotive assembly

lines, one year's inadequacies in a machine could be corrected in the following year's model. The earlier model of an automobile could still provide service. Not so with a bomber. In combat conditions, an earlier model bomber is often a death trap for its crew.

So to mass-production we had to add flexibility. Changes and additions had to be made, not on a drawing of next year's model, but on today's machine.

On an assembly line the tools, jigs, and fixtures determine in advance the exact nature of their product. A change-over in those tools, jigs and fixtures is a job of weeks or months.

The modification center which Consolidated Vultee built at Tucson, at the onset of the war, laps this time-gap.

Ships are flown to Tucson direct from the parent plant's assembly line at San Diego, to undergo two types of operations.

First come the alterations required to fit the ships specially for the climatic and other conditions in which they will operate. This work comprises about 25 percent of the plant's job.

The other 75 percent of the work at Tucson consists of modifications ordered by the army. These modifications may be executed at Tucson for a few days or for a few months — depending on the time required by the parent plant for adjusting its assembly line procedure to permit the new change in design to be incorporated in planes when first assembled.

The modifications for climatic conditions can never be incorporated into the assembly line technique. For the parent plant must continually turn out Liberators for use in Alaska, in the Southwest Pacific, in Africa, in Egypt, in the north European theatre, and anywhere else where long-range precision bombing operations may be necessary. Operating conditions in all these diverse localities are different. For each of them special characteristics are required in a bomber if it is to function at maximum efficiency.

THE Nazis learned this to their sorrow, during their first long winter in Russia. German bombers and fighters were designed for top efficiency in the relatively temperate climate of Germany. In the Russian winter, the oil in Stuka crankcases congealed, carburetion was faulty, ice formations interfered with flying formations. A period of German air inactivity enabled the Russians to consolidate their positions and hold on.

If the Luftwaffe had had modification centers to do winterization jobs, some commentators believe, Moscow might have fallen in the winter of 1941-2.

At Tucson, specific winterization treatment to fit Liberators for Arctic service calls for carburetor heat controls, additional cabin heating, and de-icing facilities.

Ships scheduled to serve in desert areas receive other kinds of modification. African wind-borne sand acts as an abrasive, for instance. Certain parts of a Liberator have to be protected accordingly; special air cleaners are installed to sift out dust and keep it out of electrical and hydraulic equipment. Special desert paint jobs, in order to make the topside of the bomber blend in color with its surroundings, of course have to be done. The fact that Liberators proved able to "take it" in the desert better than other heavy bombers has been cited by reporters as one reason for their dominant role in Middle East operations.

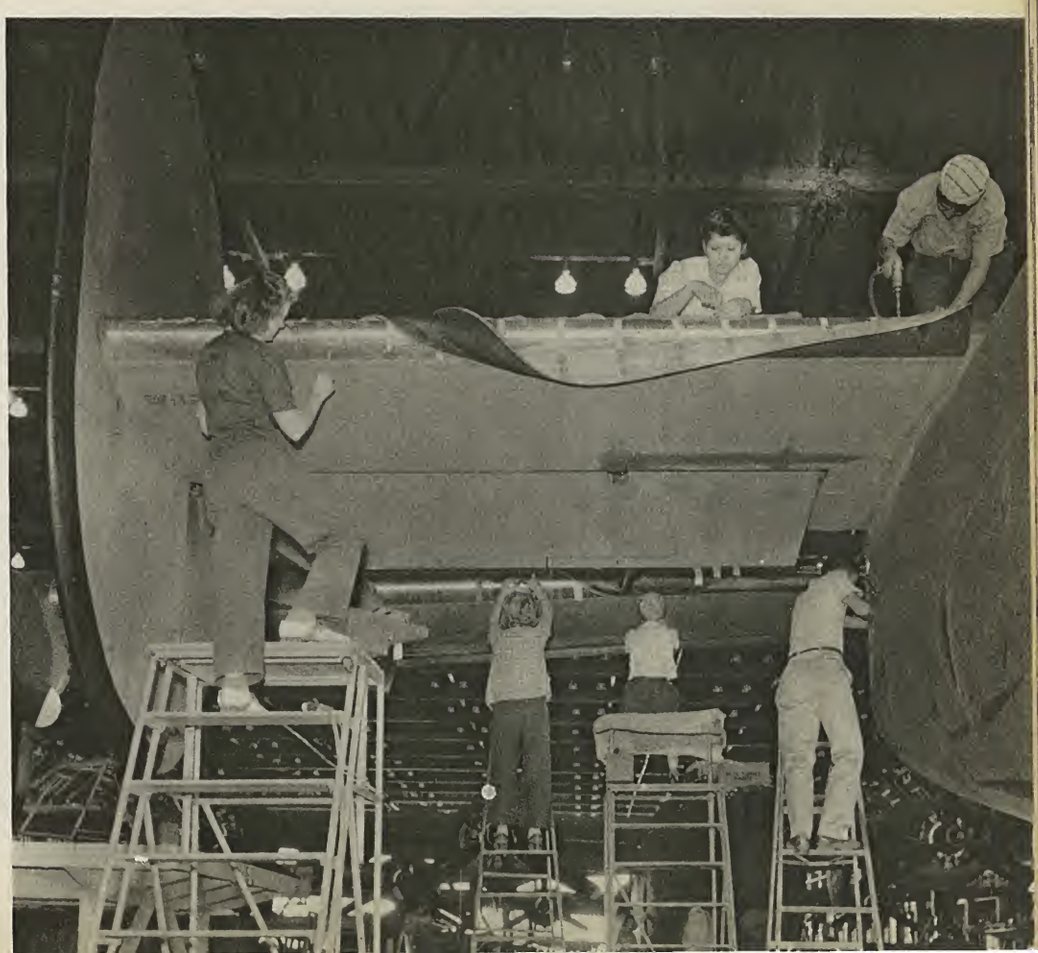
Particularly in the preparation of planes for desert warfare is the Tucson plant well fitted. Tucson, itself, is a semi-desert city. It has the dust and heat of Tunisia, and in engine run-ups engineers are able to make checks under conditions exactly parallel to those certain bombers will have to meet in the war theatre.

The 25 percent of "permanent" modifications that equip the B-24 for specific service are fairly well routinized. Crews with a special knowledge of the jobs to be done turn the planes out swiftly and without a hitch.

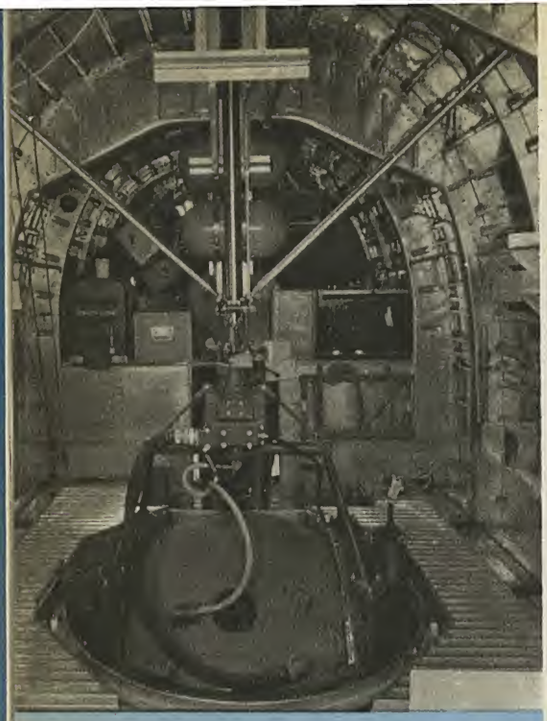
The only changes in these jobs are those ordered when no more planes are needed in a certain theatre, or when certain dangers have passed.

Recently, for example, the army ordered no more desert camouflage jobs to be turned out. The Nazis have been shoved sufficiently far away from North Africa to preclude any possibility of ships being bombed on the ground there.

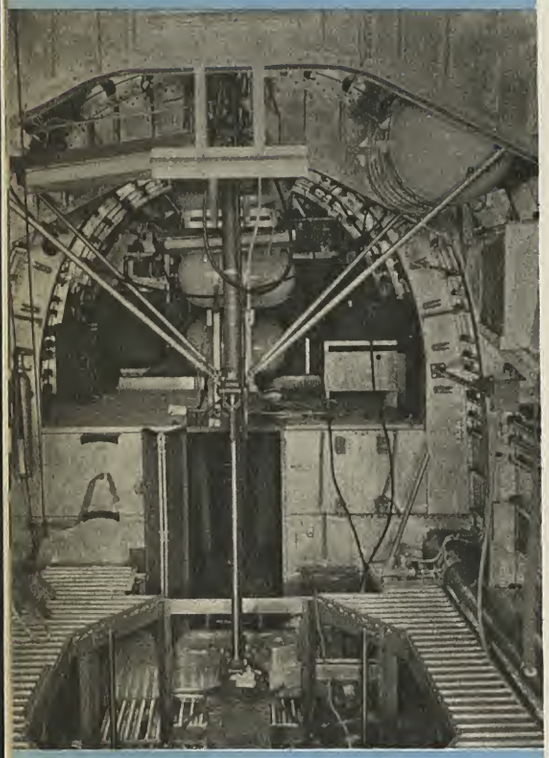
THE special job of preparing tomorrow's planes today, which occupies about 75 percent of the modification center's time and attention, is the more significant aspect of today's modification techniques. This is the job which gives the enemy some of his chief headaches.



Work on stabilizer "de-icer" boots of Liberator.



The Liberator's ball turret, largely retracted, viewed from inside the waist.



Above: The turret when down in fighting position, seen from inside the waist.

* * *

Below: The turret down in fighting position, viewed from outside the plane.

There is no record of what was said by the first Jap Zero pilot who came up confidently under the belly of a Liberator to rake it with his machine guns, only to find a Sperry-designed ball turret pop out into his face. But the story of how that turret first got there illustrates a typical modification problem.

The Liberator, which like other American bombers started out poorly armed for today's war conditions, is now a veritable arsenal carrying from ten to fourteen .50 caliber machine guns. But for a time it was inadequately defended underneath. Reports came to the Army Air Forces Special Projects Branch at Wright Field of Liberators shot down from below. Army and Consolidated Vultee engineers went into a huddle.

They agreed that installation of a non-retractable turret in the belly, like that in the B-17, was impracticable, due to the proximity of the belly to the ground when the Liberator lands with its tricycle landing gear. The phenomenal speed of the Liberator, too, would be impaired by a permanent bump on its bottom.

So the use of a retractable belly turret was suggested. Sperry developed the original turret, with the Sperry compensating sights, in conjunction with the Army and the manufacturer's engineers. Then the Briggs Manufacturing Company further developed and produced the specific type used on Liberators today.

But the turret could not immediately be installed on the main assembly line at the parent plant. Many rearrangements in the structural details of the plane had to be effected. Brackets and fixtures to hold the turret had to be devised, and lowering and retracting mechanisms. Hydraulic, electrical and oxygen lines had to be rerouted. And the change in the balance of the whole ship had to be compensated for, with consequent alterations in the control surfaces.

Since all of this would involve retooling and rearrangement in work-routine at the parent plant, the first installations were made at the modification center. Procedures not quite in accord with methods taught in engineering schools were used. Operations began with nothing but layouts and sketches as a guide. "Quick and dirty" tooling, rule-of-the-thumb engineering, did the job at the start.

In the meantime production engineers at the parent plant were developing the final designs for this new installation, and within several weeks, arrangements for the installation of the turret on the main assembly line were completed.

But meanwhile some scores of B-24's had already been equipped with the turrets at the modification center, arriving at combat fronts many weeks earlier than they would have if the air forces had waited for the parent plant to come into full production of belly turret-equipped Liberators.

THE modification procedure is standardized. Liberators rolling off the assembly line in the parent plant at San Diego are immediately ferried by CVAC crews to Tucson. On landing they are pulled by tractor to places on the modification lines, now numbering six.

Originally, before the Tucson plant was fully completed, only two lines went through the hangars and others were set up out-of-doors.

Now all lines go through the Division's three 700-foot hangars. In two hangars the lines are called "Zipper lines," the planes being staggered so that the wing of one passes a few feet behind the empennage of another. Each of the twelve stations on a line are manned by a crew chief and three assistants, working on specialized duties. A dozen Liberators move along from station to station at the same time.

In none of their jobs, which must be done swiftly, do the modification engineers have time to prepare special tools and dies. Fabrication workers have to be resourceful and fast.

Stock for some parts may be cut with tin snips and hand-formed over maple blocks. Often small parts are produced on small bench and tool room lathes. The modification center does boast a 60-ton hydraulic press. But workers there are prouder of the employee who devised a burring tool out of a dime-store disc type knife sharpener.

Modification engineers work in their sphere with the same ingenuity displayed by the mechanic on an emergency job at a crossroads garage. Both must be improvisers, working with the tools at hand, to perform tasks that often cannot be plotted out in advance.

This water color portrait of Col. John R. Kane is like Colonel Parham's writing—a realistic study of one of the great figures of the war. It is the work of Milt Marx, and is reproduced here through the courtesy of the War Department.

The Man Who's Killer Kane

By Lt. Col. Robert H. Parham

THEY said it all through the Squadron. "The Killer's a great guy, but tough—mean. Don't ever cross him. You get on his list and you're through."

But the Major, the Killer's best friend, didn't quite believe it.

The Major had been a pilot in the last war when too young to see much action, and he still yearned to fly. When this war came, he got in immediately. He was operations officer under Kane when our group moved overseas, and looked on Kane as his best friend.

The missions on Bengasi and Tobruk and the shipping strikes were not too rough; losses were comparatively nil; and the Major flew often. As one of the group of staff officers, he didn't have to go—he just flew for the hell of it.

Then he got himself a Stuka, abandoned by the Nazis south of Tobruk. It was only a couple of days until he had it purring like a kitten.

"You're going to kill yourself in that fire trap, Bob," Kane warned him several times. Then sure enough he had a crash landing, got a broken nose, and was parked for awhile in the hospital.

With that, Kane grounded him—no more such flying. Kane didn't want to lose a useful staff officer in useless sorties. The Major took it without comment, and stood his grounding for six months. Then came Naples. He was aching to try a new theory of gunnery—how you follow the enemy fighter when he's coming in at you, instead of lead him.

There were lots of fighters those days over Naples. The Major yielded to temptation and went along. A message was handed to him as soon as he returned. "Report to the Commanding Officer immediately."

When he got to headquarters and stood facing the plywood table Kane used for a desk, he was just kept waiting in the gloom. Kane went on working, behind the halves of gasoline tins that served as his "IN"

Colonel Kane and his crew of Liberator men, coming from their plane at the Bengasi desert base used to launch the Ploesti raid.

and "OUT" baskets. Then finally the Killer looked up.

"You're familiar with the orders of this group, Major," he barked. "You're through. Either you stand court martial, or I'll relieve you from this command and recommend you be reduced to your original rank. Take your choice."

A week after the Major told me this story he was a captain again, looking for an assignment.

Few people know much about Kane. He apparently had a gentle upbringing as son of a Texas Baptist preacher. Today he is a bull-like man, with a neck so big that they had to get a special new ribbon for the Congressional Medal they hung on him. At least, that's the story General Strahm told. His jaw makes him look like "Killer" Kane in the newspaper strip; that's where he got his nickname. He smokes a pipe incessantly while on the ground. In the air he chews.

I once flew with Kane in the lead ship on a mission against shipping in Navarino Bay, on the western tip of the Peloponnesus. After we'd got into formation and headed out over the Mediterranean, Kane settled in his pilot's seat, dug into a pocket, and produced a square of black tobacco. He took a great bite, sat chewing reflectively, slowly slid back the window panel and spat through it squarely with hardly a turn of his head. Then he grinned sidewise at me, pointing his left thumb to the calm ocean below.

"Too damn blue," he said. "Maybe I can color it up."

He puts his philosophy in short words.

I'VE never seen a big plane handled as Kane maneuvered his Liberator when the fighters jumped us over Navarino. When they'd start coming in, he'd bow his tree-stump arms and twist, turn, push and haul the control gear as a sergeant drives a jeep. The fighters never did get a decent shot at us, and we shot down four of the enemy. Because it was a successful mission, and spectacular with seven American war correspondents participating in it, several high decorations were awarded. But Kane, leader and star of the show, flatly refused to recommend any of his crew for awards, and declined to permit a recommendation for himself.

"It was routine," he said. "Besides, we got lost coming back to base and damn near cracked into a mountain by stumbling around."

After Navarino, it was easy enough for me to believe the story of Kane's encounter with the Messerschmitt 110 over Bengasi. To understand it, you must remember that one of the cardinal principles of heavy bombardment is to fly tight formation and never leave the protecting gunfire of the ships flying with you, for a straggler is easy prey to enemy fighters. This day Kane was leading his formation, as usual. His bombardier muffed the bomb run and failed to get the high explosives away. Disgusted, Kane pulled out of the formation, headed back, and made a second run to drop his bombs.

The 110 jumped him immediately, then chased him nearly 200 miles down the Mediterranean. Time after time the enemy fighter would make a pass at Kane's Liberator, and every time he'd get set, Kane would throw his big ship into a tight turn into the oncoming fighter and the fighter would break away. In alternating dives Kane brought the Liberator from 20,000 feet down to deck level, fighting that Messerschmitt with maneuvers until it had expended its last ammunition in the pursuit. Then immediately Kane turned about and chased the fighter in an effort to turn the tables and bring him down.

Kane was awarded the Silver Star. "It was a damn fool stunt," he says today.

I think Kane's hatred of the enemy is even greater than his hate for softness in combat airmen. In shipping-strikes at sea, he never had the opportunity to hound the enemy with anything but bombs. But when the pounding of bases in Italy got underway, the Killer began his scorched earth policy. While loading up with bombs to strike at predetermined targets, Kane would instruct his men to fill all the empty tins they could find with gasoline. To the tins he'd have his ordnance personnel attach detonators. As the big ships roared inland over the foot of Italy enroute to the target, the tins would be thrown out one by one over grain fields and forests. The resulting fires caused almost as much damage as targets suffered from high explosives.

If "Killer" Kane is a man of two faces, the officers and men who serve under him in his "Pyramidiers" heavy bombardment group have seen only one of them. It is a face compounding the cruel urge he showed in his scorched earth policy, the arrogant belief he holds that no other man can fly an airplane as skillfully as he, and the adamant will he expresses in permitting no difference of opinion in a subordinate. In the stress of combat he is ill-tempered, obstinate, completely unapproachable. These qualities do not make him the crusty "old man" with a heart of gold, to those who serve him.

Only recently I heard the first-hand story of another example of leadership that may furnish a parallel. In a hotel room in Washington, where Captain Eddie Rickenbacker celebrated the first anniversary of his Pacific rescue, he was telling me his experiences during the long days spent on tiny life rafts with his men. His main problem was not his own suffering but to steel the other men to their ordeal. He said that he so brutalized them that they came to hate him. They swore to themselves that they would fight to outlive the beast who tortured them. And most of them did come through.

Whether Kane's leadership has saved the lives of numbers of his bomber crews cannot be determined. But the records of efficiency of his group in combat are among the best established in this war.

When plans were drawn for the historic bombing of the Rumanian oil refineries at Ploesti, they called for a specific number of aircraft for a specific, well-defined group of targets. A number of Kane's combat crews had finished their prescribed hours of action against the enemy and were ready to return to the United States for a rest and a tour of training duty. His group was the largest in the Mediterranean theatre at the time.

KANE'S voice was raised loudest of all against the plan of attacking the refineries at low level. The method meant certainty of heavy casualties. But once the decision was made, over his protest, Kane ordered all his available crews, including those which had finished their prescribed tours of duty, to participate. And Kane led the attack himself.

The Ploesti attack won three Congressional Medals of Honor for its participants — the first time in history more than one such award has been made for a single action. Kane received one of the awards, Colonel Leon W. Johnson another, and a third went posthumously to Major John L. Jerstadt. The rest of the story of the mission, tremendously successful despite losses of 53 Liberators out of 177 that flew, is now legend:— how Kane and Johnson and Jerstadt led their formations into the blazing inferno of their already bombed targets; how they alerted enemy defenses at housetop level, and wrecked the greatest source of Nazi fuel; how Kane's "Pyramidiers" suffered the heaviest losses among the five groups which took part; how Kane held together his battered Liberator "Hail Columbia" with sheer will-power, and brought it safely back on two engines, in what experts said was an "unflyable condition," to a landing on the Isle of Cyprus.

The Colonel at the controls of his Liberator.

The heavy losses suffered at Ploesti, running to over 40 per cent of the ships and men, occasioned the nearest approach to sentiment I have ever heard from Kane. "It was awful," he said, "to see those big Liberators falling around the target like swatted flies."

In the first flush of the great victory, Major General Lewis H. Brereton ordered promotions for a large portion of the participants.

First Lieutenant Royden L. Lebrecht of Denison, Texas, who had been promoted only shortly before the raid and who flew one of the wing ships to Kane, finished his tour of combat duty nearly a month later, and was ordered to return with plane and crew to the United States for a tour of the nation and later assignment to a training unit. He did want a Captaincy before he was routed home. He reported to Ninth Air Force Headquarters at Cairo, and inquired whether the promotion policy for Ploesti veterans still held. He was told that it did not, and that he had no chance.

Kane was in Cairo at the same time and Lebrecht's request was reported to him. "What the hell does the kid want," the "Killer" exploded. "He was promoted only a few weeks ago." That ended the conversation. But later in the day Kane was seen to enter General Brereton's office for a conference. The following morning, Lebrecht got his Captain's bars.

"I used to think I'd never understand Colonel Kane," Lebrecht told me later. "Most of the flyers are afraid of him, and they know he'd court martial his own brother if the guy disobeyed his orders. What they don't know is what I didn't know either, until just the other day, when I was ready to leave.

"So now I'm wondering. I think maybe he hates to see those kids go out when he knows some of them aren't coming back. He'd never let them know that. Maybe he won't even let himself know it. So he's tough as hell — and toughest of all when he's sending them out. Maybe that's why his gang of kids take off so sore that they're hell bent to destroy anything they get in range of.

"Now if he can do the things he does to guys he loves, you can imagine how he'd treat somebody he hates. By God, he'd kill them. And he does."

Sitting Duck and

These pictures of Cats on our war fronts are U. S. Navy photographs.

In early 1942, when we still felt woefully surprised over what our enemies had sprung on us, reporters rushing to our outposts wired back, with mixed pain and indignation, that in comparison to Zeros our Catalinas were Sitting Ducks. Patriots felt righteously indignant over the Navy's implied failure to be forehanded with some Zeros of its own. And for awhile it was a critic's holiday.

But the Sitting Duck has gone through the fire and emerged as the Phoenix of the war. Today there is no plane so loved, so relied on, so wrapped in tradition as the Navy's Catalina. When, over a year after the war began, the Navy placed orders for building $30,000,000 more of the amphibian PBY-5A, the Cats had already become a part of American legend.

They were of course never meant to battle Zeros. The Zero was a land plane, even though the Japs did put floats on it for their Aleutian drive — a fast fighter dispensing even with armor for speed. The Catalina, carrying a heavy hull to permit landing on the sea, and bombs hung on its wings, was bound to seem slow by comparison. It was.

But . . . in those terrible fogs, winds and icy seas that the Japs relied on for protection while seizing their first American foothold, the Cats rose to the kill.

Today we have evidence that the Japs

nd Phœnix

It's also called the Cat. It was an old-timer even before the war began. But — how it came to life!

probably meant to take Dutch Harbor. Had they succeeded, it might have entailed the ultimate loss of Alaska and even the whole west coast. But they were turned back and landed at Kiska and Attu, with ultimate results that all know. The Cats didn't do it alone — but without the Cats our land planes might never have found the Jap fleet in those clouded seas.

When a Navy tender first sighted the Jap's approach to Dutch Harbor through the Aleutian mists, a Catalina squadron — spread out fanwise on watch over the island chain — made first contact with the invading ships. As fast as conditions permitted, the Cats rushed back to base to alter their armament from depth charges to torpedoes, then went out again looking for an aircraft carrier that had been spotted. It was all a grueling job — the base was only three weeks old, and every torpedo had to be loaded by hand. Nor were there ready victories at hand to cheer the men on. The Jap carrier was missed in the fogs, and four times Jap planes bombed Dutch Harbor. Then, on the fourth, the Cats led Army bombers through the fog toward two Jap carriers near Umnak, which were serving as the spearhead for an expeditionary force. The larger of the carriers, believed to be the Ryujo, was hit. It retired northward, where the second eventually joined her.

How the Catalina pilots returned time and again for refueling to their base with their planes riddled — how many kept going until their fuel was completely spent, knowing they would be forced down at sea but unwilling to break contact with the enemy — all that will be retold thousands of times before men forget this war.

The pilots, seeking for holes through the heavy clouds and mists through which to spot their prey, even began using their Cats as dive bombers. When the enemy took refuge at Kiska, the pilots sought them out by diving at the unheard of speed — for PBY's — of 250 knots. Forcing the ship's nose down, they would plunge recklessly

Acme Photo

Airman rescued from Pacific under Jap noses

to the prey, drop their bombs, then pull back on the yoke with the four hands of pilot and co-pilot combined in full strength, to get the ship out of its dive.

The big boats would recover with their long panels flapping like a sea-gull's wings. And no one was more surprised than the pilots themselves that the planes held together. For the Catalina had been designed as a long-range patrol ship, not a dive bomber. And no one had ever thought of subjecting it to such stresses as routine.

Cat pilots sometimes worked 20 hours out of the 24 in hunting Jap ships, shore installations, and submarines. At least once they even helped take submarine prisoners. Three PBY's, for instance, having disabled a Jap submarine in joint maneuver, saw five Japs pop out. It called a destroyer to the scene, and when the destroyer finished the sinking with gunfire, it took the Japs aboard.

MOST important of all missions were the unsung scouting expeditions that the Catalinas maintained regardless of weather conditions for practically 24 hours a day. The Cats would locate the prey; then, when breaks in weather permitted, the Army's bombers and fighters would go out for the kill. Probably such teamwork between Army and Navy flying groups had never before existed. The attacks by Army planes were covered by Cats, so that if any of their pilots went down and landed on the water the seaplanes would have a chance to land on the sea and pick them up. It was a wonderful recipe for maintaining morale.

The Catalina work against Jap subs in the far north was duplicated time and again in their sinkings of German subs in the Atlantic and Caribbean. A number of the crews of the destroyed submarines have been rescued. When rough seas prevent landing on the water, crew members of the Catalina often drop life rafts, along with emergency rations tied to life jackets.

The success of the airplane — particularly of the long-range plane like the Catalina — in dealing with the submarine menace, was undoubtedly a factor in the Navy's decision to use the long-range Liberator in submarine warfare.

This greater use of Liberators by the Navy has helped make more Catalinas available for the vital work of patrol and rescue. Because they can land on the sea, the Cats are performing rescue feats few other planes encompass.

In the South Pacific particularly, where the over-water flights must be very long and many a flier has fallen far from land, the near certainty of being rescued by a Navy plane is one of the greatest sustainers of the human spirit.

The flier who has to come down on one of the lonely atolls of the Pacific may not know how it is the Catalina finds him. But he does know he has a better than even chance of being picked up, for it is the talk of every airfield, every encampment. It is estimated that over 60 per cent of those who land, unless they are killed outright by the fall, are rescued. No wonder they love the Catalina as they love nothing else that flies.

The rescue work in the South Pacific is divided between the two-passenger Kingfisher and the Cats. When there are only one or two survivors sighted, the Kingfisher can settle on the water and bring in the stranded without more ado. But frequently there may be from five to forty men, and then the Catalina is given the job.

The air rescue service in this South Pacific area is under command of Major Michael Sampas of the Marine Corps, and is based on Guadalcanal. Between April 1 and July 15, the latest period reported, a total of 337 persons were rescued and returned to the United States. Of these, 10[illegible] were pilots and crew members who had made crash landings or had parachuted to safety. Many of them were rescued right under the noses of the Japs.

Major Sampas, now 32 years old, has personally conducted many of the rescue flights in a Catalina and received the personal commendation of Admiral William F. Halsey for his work in organizing the air rescue service.

WHEN pilots are reported down on the outlying waters, the radio call comes in code, to rescue duty.

The big Cat, dozing on the water, lifts itself slowly, then tears off with throttles wide open, to keep up with the fighter planes that usually accompany a rescue mission into the fringe of Jap-held territory.

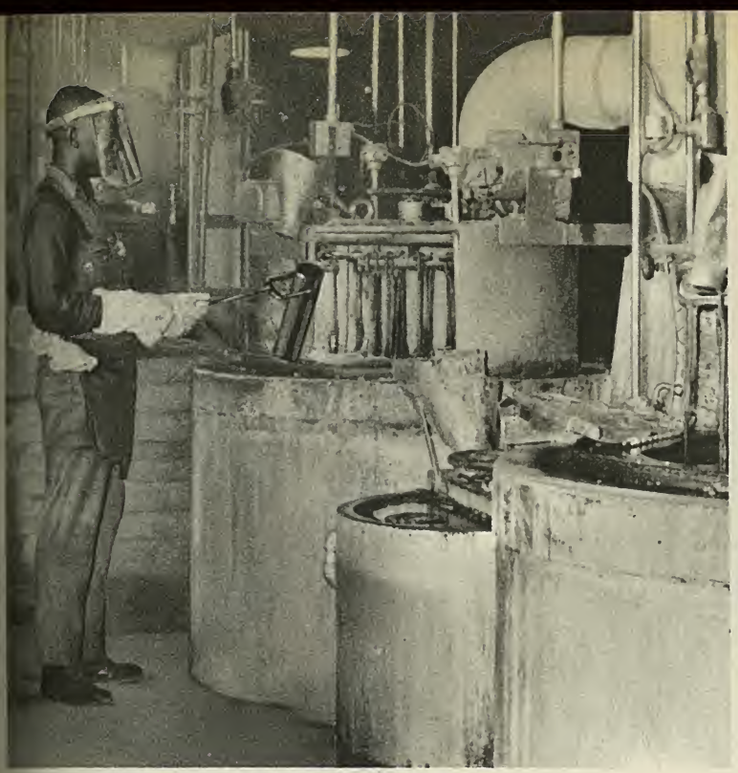
A trained aviator is a precious being, and his rescue is as much a cause for rejoicing as the return of the lost sheep of the Scriptures. Not only does he represent an investment of $25,000 to $30,000 in money. More important, once he has gone through combat, the experience he has gained has given him training that money cannot buy.

After the dangerous and exciting work of picking up airmen survivors following an engagement, the Cats will often reconnoiter all the nearby beaches for days thereafter. Many an aviator has been rescued long after he was shot down. The PBY's even have helped in ambulance work when the regular ambulance plane facilities were hard pressed.

"Everybody loves a Navy PBY pilot," the saying goes in the Solomons. They are the most popular men in the battle areas, because of their rescues, and their fellow Naval airmen, Army, Marine and New Zealand pilots, consider them pals.

The Japanese consider their fallen fliers expendable; they make no effort to rescue them. Our own policy has been to do everything possible to bring back a survivor. As a result United Nations pilots fight harder, fly far out to sea whenever necessary, knowing no effort will be spared to pull them out of trouble.

In jobs like these the Cat has kept doggedly on, performing thousands of missions that were always emergencies. It may still just be an old duck. But to the men who love it, it sings.



Above, furnaces where rivets are heat-treated.

Above, refrigerators for storing "D" rivets.

300,000 RIVETS

AN idea for packaging rivets in transparent bags has revolutionized rivet handling at Consolidated Vultee.

Each Liberator bomber needs more than 300,000 rivets to hold it together. Workers used to drop them frequently on the job. Once 23 tons were swept up, and had to be sorted into 400 different sizes and kinds.

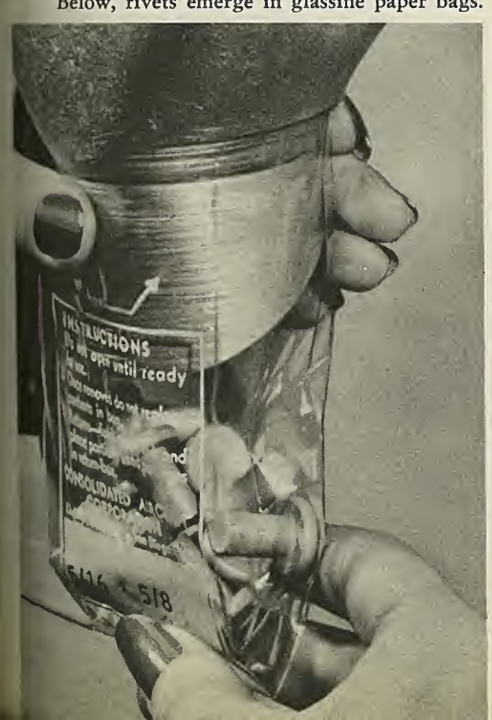
Today the rivets are packed in cellophane. The bag is stamped with the rivet's size, and is packed automatically. The worker is saved time in finding the size he needs, and few rivets get dropped.

Two types of rivets are used. One is called the "AD." This is dyed a greenish-yellow color to distinguish it. Following its heat treatment, it is allowed to harden four days at room temperature. It can then be driven without cracking.

The second type, called the "D" rivet, is made of a harder alloy, and is about 10 per cent stronger than the "AD." It will crack if driven after it is age-hardened. Hence it is kept in refrigeration to arrest its hardening, until needed on the job. These "D" rivets stay cold in their bags for an hour and a half after being taken out of the refrigerator, because the bag acts as insulation. They are delivered to workers on the line in ice-carts.

Above, part of the rivet packaging machinery.

Below, rivets emerge in glassine paper bags.



Above, sealing the rivets in the handy bag.

Below, storage rack for labelled rivet bags.

The Bombers and The Bombed

By Ivan Dmitri

WE ourselves had bombed Palermo many a time with Liberators. Now we were intrenched there, and the Germans were coming back to bomb the place again — to sink our ships disgorging supplies in the harbor, and wreak what further ruin they could. The Sicilians had died by American bombs; now they were dying by German bombs, which started falling the first night I was there. Sometime toward dawn, when the all clear was finally sounded, I went down to the harbor area to photograph the rescue squads collecting remnants of humanity in baskets, and spreading sheets on corpses whole enough for stretcher bearing.

Up the hillside, where the town wandered away from the harbor, our occupying forces were stringing the electric wires that would re-establish communications; AMG was setting up its offices, in half-ruined buildings, for civilian administration; the populace was creeping out of cellars to join the lines receiving distributions of American food; the dark-eyed children were scurrying through ruins like excited monkeys, stretching hands out toward every passing soldier to ask — and usually get — some candy. Hard candy is an important part of the boys' sugar rations.

Now and then, as I photographed the human wreckage, I asked questions through an interpreter who had been assigned to me.

"Tell me," I asked one old woman, lines heavy in her face as she held a woebegone child, "how do you feel about the Americans and their bombing your city?"

She spread one hand in a helpless gesture. "It is the Will of God, Signor," she said, without bitterness. "It is War. The Americans are a wonderfully strong people."

"And how do you feel about the Germans?"

The hand stroked the whimpering baby, and her reply was equally without rancor. "It is War, Signor. The Germans are a wonderfully terrible people."

With the bloody pavement beneath her, and around us the rumble of the jeeps crawling up from the shattered harbor, her resignation recalled words of Spengler:

"Survivors fill up the gaps with a primitive fertility and suffer on. People manage with the situation as it is and the powers that be."

The Sicilians were cheering our victorious soldiers — just as they doubtless once cheered the cohorts of Mussolini. The helpless, caught up in the war-march, were adapting themselves to whatever force prevailed.

Copyright 1944 by Ivan Dmitri

SOME disembodied force in war, quite impersonal, overwhelms both bombers and the bombed with its objectivity. If you have a boy in the air forces, and you read that "the raid was successfully executed with light losses; only ten bombers failed to return"—then the impersonality of war can seem cruel. But it makes war tolerable.

I remember a bombardier telling me, "Whenever I'm on a mission I don't think of those it hits. They say fleeing Germans in Hamburg got stuck in boiling asphalt on the streets, and died that way. Children too, probably. But on a mission I think, 'Well, don't blame me. I'm just on a job of hitting a target.'"

So it is not merely strategists who think of war in its formal definition — as a contest by force between two or more nations with opposing principles. The fighting man lives with that idea, too; it is a part of his training. Standing on the field of one of our foreign bases, any airman can almost feel the American Will as an actual current of power — traveling like electricity along transport and supply lines — shooting out farther and farther through all the branching units of our armies —until it blazes incandescently at the fronts.

Practically every soldier finds strength in

Above, Dmitri shows you an airman just after he has received first aid treatment for his burns. At the left, some of our troops are entering Palermo; much of the wreckage was from our own bombs.

Dmitri

that idea, however he expresses it to himself.

He has no resentment that in a warring society he has ceased to be primarily an individual — is now functioning almost purely as a cell in the total Organism.

Our airmen, especially, are aware of their vital status, as man-cells in the war-machine. They find in their assignment a new sort of comradeship that in civilian life they never felt. They become conscious of a strange kind of importance, as conductors for an extraordinary power. And, indeed, the ten men of a Liberator crew carry more concentrated power than any warring society has ever previously managed to put in the hands of so few soldiers.

There are other factors that necessitate the airman's being given special treatment.

They often take greater risks than others; carry greater responsibilities in the wastes of the skies; bear the brunt of the attack; do work that frequently saves innumerable lives for our ground forces.

Because of all this, our combat men are exceptionally well cared for. They are given various privileges, such as leaves not accorded other troops. Even in the wastes of the African desert, I found them surrounded with every comfort which the Organism could provide in such a rude environment.

I HAD looked for the Liberator crews all through Africa, as I flew the deserts under the auspices of the magnificent Air Transport Command. I first found them secretly massed at Bengasi, for the Ploesti raid. They had been brought there from all over Africa, and from as far away as England. Colonel Ted Timberlake was down from the 8th Air Force in England with some of his finest Liberator crews, linking forces with the 9th under General Brereton.

The losses on the Ploesti raid were of course enormous, and the heroism of the men who dived into the flames, and sometimes died there like flies, incredible.

Such men quarrel with the daily discomforts of their routines, but accept possibility of death without a whimper. I photographed the surviving members of a crew whose plane had burned. One boy said to me quietly, "If I don't come out of this, will you write my mother and tell her what happened?" There was no complaint.

He hoped simply to have the full record live on in the memory of one he loved.

Engine changing on the desert: "Crews literally caress the ship that has carried them safely through."

Almost everywhere I went among the great bases we had established in Africa, I found the Liberator men asking why so little news about them had reached home. The fact was that the Liberator, because of its range, and its ability to withstand the grueling desert, was used in the Middle East more largely than any other heavy bomber. But, until the Ploesti raid, the valor of the Liberator crews — which had done so much to make our Middle East strategy possible — was seldom reported.

Meanwhile the Flying Fortress crews, largely concentrated in England for raids on Northern Europe, were covered by our correspondents so completely that Americans at home often had the impression that Fortress men were doing the most heroic part of America's job.

The Liberator crews, as well as the high officers in command, could not understand this, and expressed extreme regret. I do not think it was "credit" which these men wished to have, in any ordinary sense of that word. What these men wanted was their place in the American heart at home.

The hope of men to survive their death, by whatever word or memory or picture, came to me never so strongly as one evening on the desert, after an outdoor briefing session preparatory to the morrow's raid. I knew, and doubtless the boys knew, that many would not return, for it was to be a major mission.

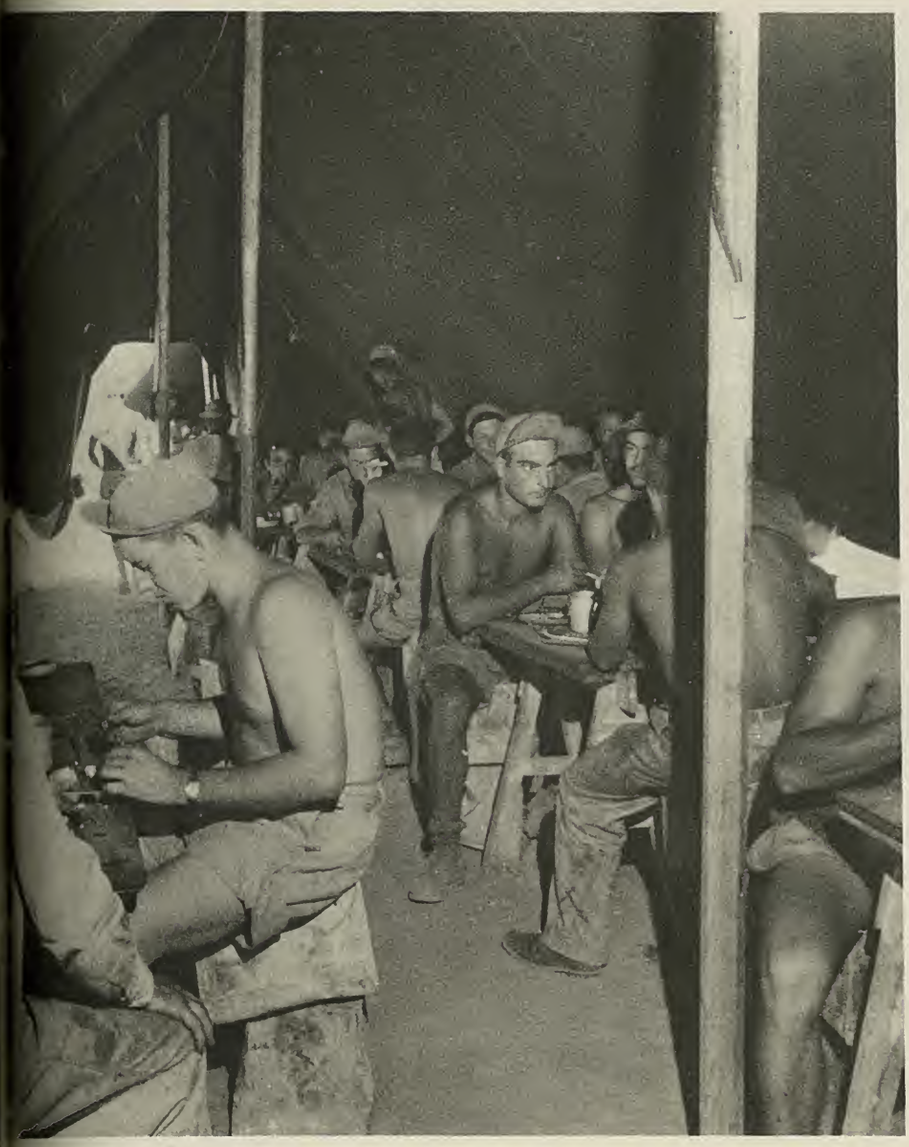
I asked Major John A. Brooks, after he

Briefing session: "Whenever I'm on a mission I think, 'I'm just on a job of hitting a target'."

had given all instructions, if he would hold the boys in position long enough for me to secure some photographs.

"Why, certainly. The boys are tired, and eager to go to dinner. But a few should be willing. We will ask for volunteers."

The whole crowd of boys volunteered. And even after I had finished the photographing, many of them hung on for talking and question asking. All of them



Chow time under a baking tent in the terrific desert heat — good food, flies, and hot, naked men.

appeared very nonchalant about their approaching mission. But a little later I found a great number of them busily writing, and an officer explained that many of the boys, before a big mission, will sit down to write their "last" letter, to those they love.

Riding in a jeep one afternoon, I overheard a long discussion between one of the Operations Officers and his Flight Control Officer. It was a question of which crews should go on the next mission. In particular, they were discussing a young co-pilot who had just been made a full pilot, and were wondering if he were experienced enough to be given a part in the task. For the moment, the destiny of this man, and indeed of many men, was being threaded through the hands of these two young officers, who sensed their responsibility keenly. Many of the boys were their personal friends; some might not be coming back.

In making their decisions, the two officers had to isolate their reasoning from every personal emotion. Not primarily because they had to be fair to the pilots. But because their first loyalty belonged to the Organism, and its purpose. Their decisions had to rest on how that purpose could best be served, without regard to friendship.

Those in command must make such decisions constantly, and sometimes on the spur of the moment. There was, for instance, the Liberator that caught fire after its run on the target. The desperate crew, failing to put it out, wanted to jump and abandon ship. The pilot rang his bell and called the men — all of them his friends — to the flight deck. "You ——, you go back and put that fire out," he yelled. "Or else you burn with the ship." The men obeyed, and finally succeeded. And the ship was brought to base successfully.

One might think from this that war makes men completely hard and terrible. But in almost all men there are quanta of love and tenderness and human yearning that, however re-directed, cannot be suppressed. And so you will find, after the decisions have been made and executed, rough men being as tender with their wounded as women could ever be. You will see them lavishing love on stray children, and taking infinite pains to make some little mascot dog happy. You will discover them pouring out devotion on inanimate things, as when crews literally caress the ship that has carried them safely through disaster — or kiss the ground, as did three hard-boiled men from Killer Kane's crew, on finally landing their Ploesti-battered ship in Cyprus.

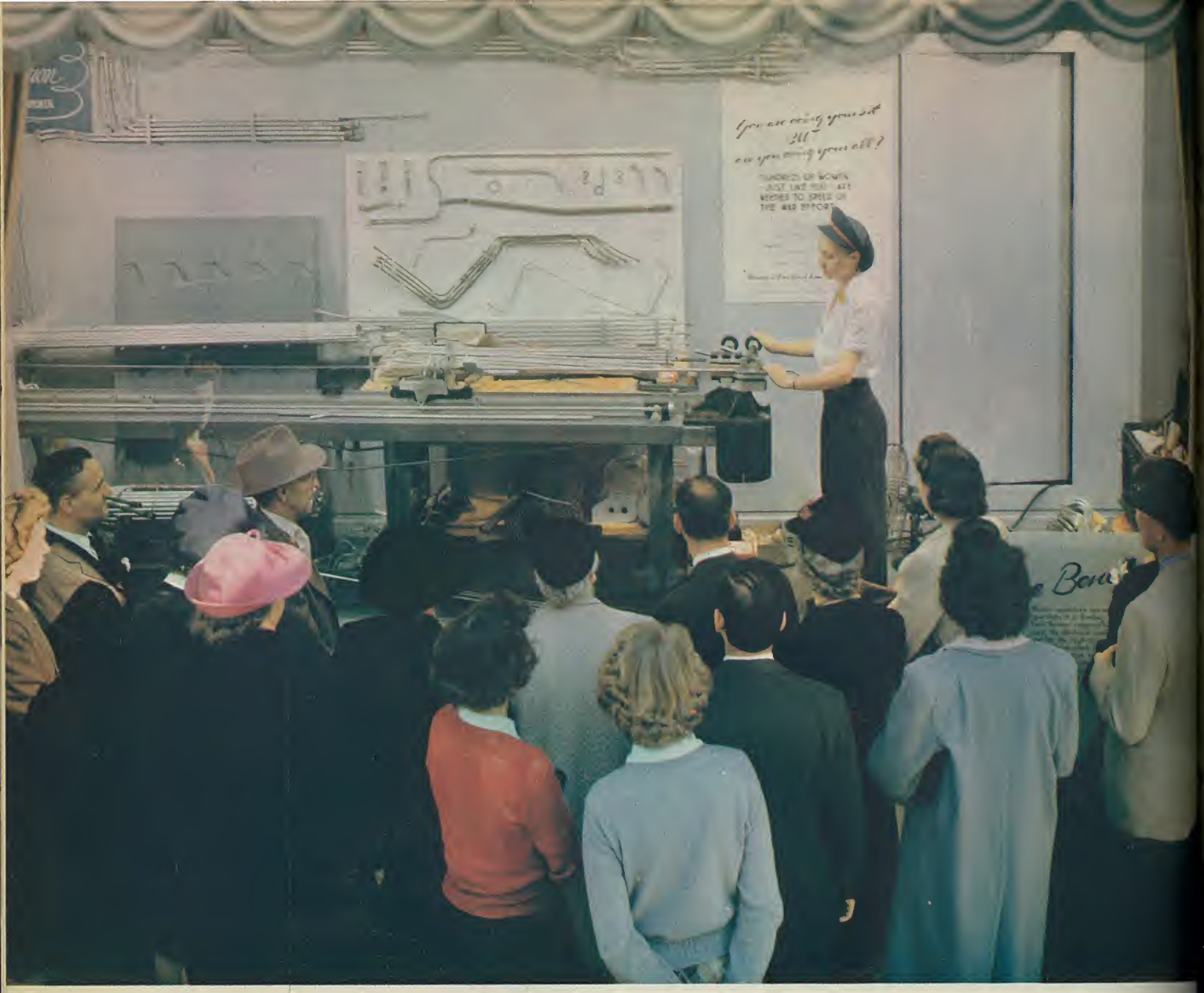
The pressures of war do not make a different kind of men. They merely cause men to act in a different way.

War, for instance, does not make men fearless. It forces them to endure fear, like any other kind of suffering. That struck me first at Algiers, where my own baptism of fire came one night in a street overlooking the harbor. The Germans had come to bomb our installations, swooping down over the hills toward the waterfront. A friend and I were caught in the direct line of crossfire between the planes and our harbor guns. We dropped to a gutter as the bombs and gunfire sucked our breath away. We lay there for awhile, sick with fear, as earth and body trembled together.

The men who fly our great bombers live with such fear time and again, for many hours on end. Most of them make no secret of it.

Some of them finally crack under the strain of the suffering — there is no opiate for this pain.

Even those who bear up under it do not think of themselves as brave.



Workers Wanted!

How and why a group of women employees began making plane parts in windows in San Diego.

Photograph by Otto Menge

IN crowded San Diego, Consolidated Vultee tries to persuade every able-bodied woman to put her shoulder to aircraft building, if she is otherwise unemployed. Regardless of her age or the fact she doesn't need the wages, an effort is made to show her that the work is pleasant and not too difficult, and to appeal to her sense of duty to help with it.

In late 1943, five leading department stores in San Diego loaned their windows to help dramatize this message, in living displays showing Consolidated Vultee women actually making plane parts. Two of the stores permitted the Corporation to have employment interviewers stationed on the ground floor in a booth, properly identified. Women desiring to go direct to the plant had the facilities of a station wagon.

One of the problems of industrial relations managers has been to lift the "bugaboo" in the minds of women regarding factory employment. The result of these window displays has been to make many women say to the interviewers, in effect: "Well, if it's as easy as the job I see in the windows, I'm sure I can handle it myself."

During changes of shifts, hundreds of women aircraft workers showed their interest in the campaign by visiting the windows in their natty uniforms of blue denim, and acted as voluntary aides in answering questions about their jobs from the thousands of people who passed.

Consolidated Vultee regards the campaign as one of the most fruitful yet undertaken.

One new plane, however good, does not make airpower. After engineers have designed a plane for flight, others redesign it for speedy volume production.

Engineering Production

For many years two American products resisted the trend to volume production methods — ships and airplanes. Ships, because they were so big. Airplanes because they were so complicated, and orders were so few. Until shortly before America's entry into the war, both continued to be built by slow "custom" processes.

But today ships built by volume production methods cut wakes across all oceans. And in two years the skies of the world have come to roar with the volume of American fighting, bombing and cargo planes.

Two forces have made possible the rapid march of our aircraft industry to its present production records:—large orders, plus the native American genius for solving complex engineering puzzles.

Spearheading the drive to expand our airplane output with no sacrifice of quality and precision were our production engineers.

There are many kinds of engineers in aircraft. The design engineers design a plane for flying. The production engineers then step in and redesign it for volume manufacture. They bridge the gap between the *aerodynamic* know-how of airplane development engineers, and the *manufacturing* know-how of tooling and methods engineers, industrial engineers, and skilled supervisional personnel.

This is not simple. The production engineers must take great care in their work that they do not destroy the fine balances incorporated in the original plane design.

An airplane is a delicate balance of strength and lightness. Useless strength becomes deadweight. This would seriously limit the airplane in combat or transport. An airplane is also delicately balanced in the distribution of its weight, whether in taking off, landing or flying. The weight is carefully distributed fore and aft in relation to the area and position of the wing and tail surfaces. Clearly, the safety and the performance of the aircraft would both be radically altered by any changes made in

"One of the biggest tasks of production engineers is to locate cleavage lines for volume production without weakening the plane structurally."

balance through indiscriminate addition or subtraction of weight factors.

Now such unbalancing changes could readily result, when an airplane is broken down into parts (or sub-assemblies) for volume production. For every such part must be spliced in assembly to make larger and larger units, until the airplane is finally completed.

One of the biggest tasks of the production engineers is to locate cleavage lines that will satisfy the requirements of volume production, without weakening the airplane structurally. Otherwise, excessive weight in the form of splice plates will have to be added, to restore the plane's requisite strength.

THE importance of breaking down the plane into relatively small assemblies for volume production is well illustrated by the nose fuselage section of the Liberator B-24. A major sub-assembly itself, the nose section formerly needed fifty working days by a crew of six for its complete assembly and the installation of all the equipment.

Literally the nerve center of the big bomber, it contains several hundred thousand parts and rivets, about 13,000 feet of wiring, 2,000 electrical and plumbing connections and some 2,000 feet of tubing.

Chief limiting factor to speedy production of the nose section was the lack of working space. This was overcome by breaking the assembly into panelled sections that could either be placed on edge vertically, or laid down horizontally, permitting large numbers of workers to do the riveting and install parts and equipment conveniently and quickly. By this new method, one third the former number of workers could now turn out 33 times as many completed units, with a consequent saving not only in manhours but also in factory space.

But before this improved method of assembly could be put into operation, the production engineers spent many hours redesigning the interior arrangement of the nose section — figuring out splices in the skin, the fuel lines, the oxygen lines, the electrical lines and control cables — and determining the proper sequence of each operation so that holes would be drilled, rivets driven, and equipment installed without interference from parts already installed.

As with the nose section, so with the other components of the plane. The remainder of the fuselage, the wings, and the empennage are in turn divided into smaller units, and these units again subdivided. Every step in this opening-up process must be plotted by the production engineers without disturbing the aerodynamic design originally established for the plane.

Another function of the production engineers is to redesign detailed parts to permit improved methods in manufacturing. In the wing of the Liberator, for instance, are liquid-tight compartments that form fuel tanks. In the inside of each of the four corners of a tank are small corner plates, similar to those found on the outside of the four corners of a suitcase. Previously these were made by welding three steel pieces together. Now they have been redesigned so they can be formed with a drop hammer from aluminum alloy, in just one step. Another saving in manhours resulted.

Here is a similar instance. The tracks on which the Fowler flaps travel were originally made out of three flat strips of steel welded together to form an I-beam. Ten sections three feet long were needed for each Liberator. The production engineers redesigned these flaps for manufacture as a one-piece drop forging, with another large saving in manhours resulting from doing away with welding.

But such redesign for volume production is not the only function of the production engineers. The design of an airplane is never done. Constant changes in design, made in accordance with flight findings, must be effected in the equipment, the structure, the armament and the exterior surfaces of the plane.

Some of these modifications are made for safety, and some for military necessity. Over 1100 major design changes have been made in the Liberator, for example, since the prototype made its first flight December 29, 1939.

Most of the time there have been three variations of the Liberator. Earlier there was one for the French, one for the British, and one for the United States. Today there is one for the Army, one for the Navy, and a transport version for the ATC, called the C-87. Although they are generally the same, a redesign for each was required by differences in the location of crew stations and in the types of armament. For the transport version of the Liberator, the required changes were even greater.

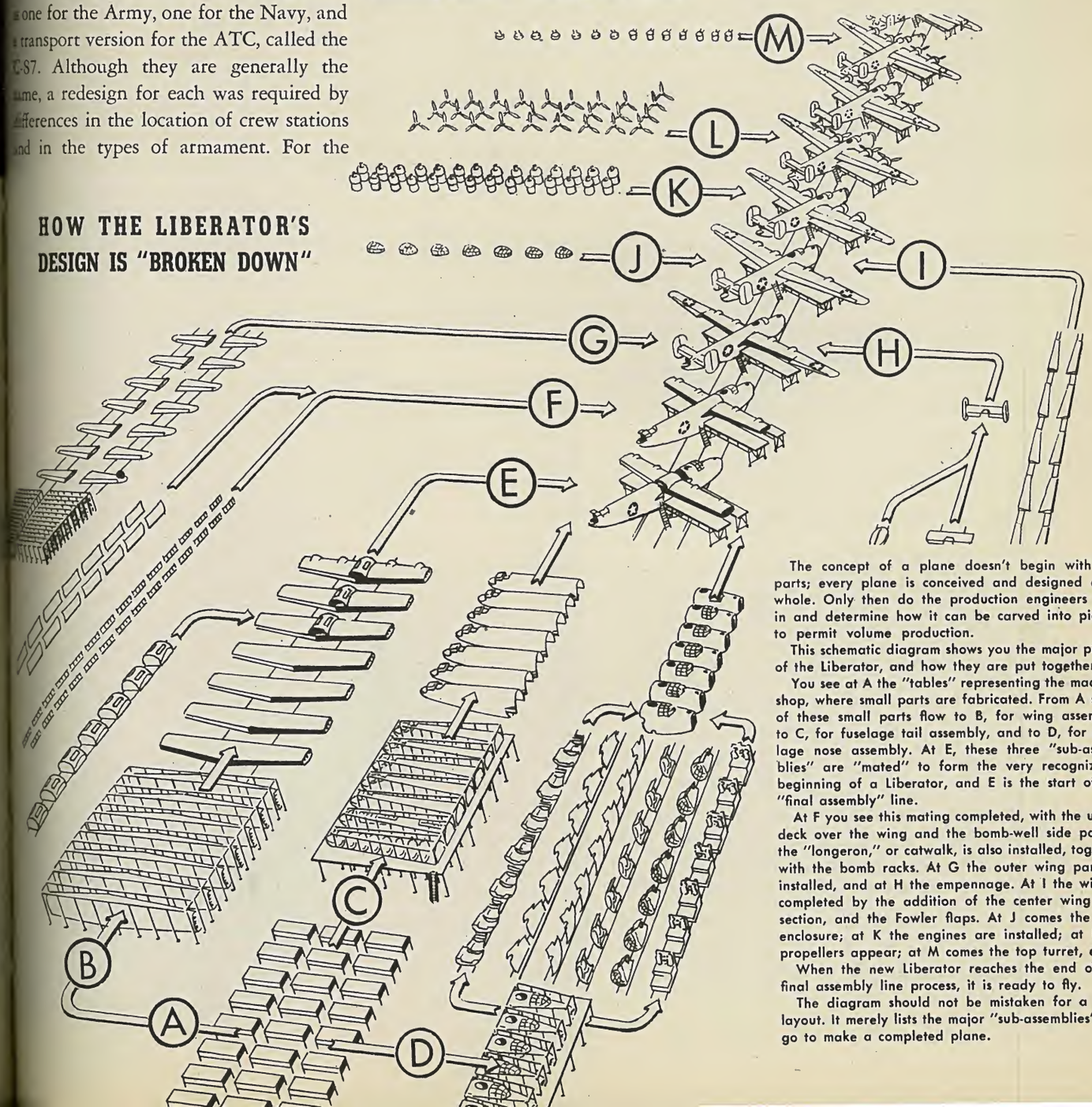
Today's Liberator reflects some of these differences in its appearance. The addition of three feet to the nose is readily apparent in comparative pictures of the prototype and the current model. But most of these new developments have occurred within the plane, and there is little external evidence of the thousands of engineering hours that were devoted to drawing and redrawing the original design.

Changes in design are frequently of such a nature as to affect the work of thousands of men at airfields in the United States, and at depots and operations fields scattered across the world, who are engaged in the exacting work of "keeping 'em flying."

Traveling "production service" engineers go to these bases to explain and demonstrate major design changes in terms of modification maintenance and repair procedures. Aircraft mechanics at the bases get a steady flow of literally thousands of engineering drawings and instructions covering each new development, whether it is large or small.

The volume production of aircraft we have attained by such methods is an achievement our enemies thought us incapable of. Production engineers underwrote much of our success when they successfully transformed the superior aerodynamic designs of American development engineers into manufacturing designs for volume production.

HOW THE LIBERATOR'S DESIGN IS "BROKEN DOWN"



The concept of a plane doesn't begin with the parts; every plane is conceived and designed as a whole. Only then do the production engineers step in and determine how it can be carved into pieces, to permit volume production.

This schematic diagram shows you the major pieces of the Liberator, and how they are put together.

You see at A the "tables" representing the machine shop, where small parts are fabricated. From A some of these small parts flow to B, for wing assembly; to C, for fuselage tail assembly, and to D, for fuselage nose assembly. At E, these three "sub-assemblies" are "mated" to form the very recognizable beginning of a Liberator, and E is the start of the "final assembly" line.

At F you see this mating completed, with the upper deck over the wing and the bomb-well side panels; the "longeron," or catwalk, is also installed, together with the bomb racks. At G the outer wing panel is installed, and at H the empennage. At I the wing is completed by the addition of the center wing rear section, and the Fowler flaps. At J comes the nose enclosure; at K the engines are installed; at L the propellers appear; at M comes the top turret, etc.

When the new Liberator reaches the end of this final assembly line process, it is ready to fly.

The diagram should not be mistaken for a plant layout. It merely lists the major "sub-assemblies" that go to make a completed plane.

BRINGING GERMANY TO HER KNEES

The Strategy of Allied Air Attack

Ninety German cities are marked for death, according to the Commander-in-Chief of Britain's bomber command, Air Marshall Sir Arthur T. Harris. "We propose to emasculate every center of enemy production," he declares. "Forty are centers vital to the German war effort; fifty others can be termed considerably important."

The program is the greatest trial by fire ever devised for a nation, also the greatest test yet imposed on air power. If the test succeeds, the final invasion of Germany by land may be made much easier for our ground troops.

Creation in November of a brand new American Air Force, the Fifteenth, is an important part of this undertaking. Our Fifteenth (under Lt. Gen. Carl A. Spaatz) is operating from bases in southern Italy. Our Eighth (under Maj. Gen. Ira Eaker) is operating out of England. Practically all of Germany can be blanketed by our heavy bombers so distributed, flying on missions with radii of 600 miles or less, as this map shows. Short range bombing means not only that the Liberators in the Eighth and Fifteenth can carry heavier bomb loads. It also means they can be given escorts of fighter planes to protect them.

Such fighter escorts have recently helped greatly to reduce our plane losses on missions over Europe.

The map shows some of the more important German centers, some of the things they stand for industrially. Objectives for destruction by bombing are selected by our Bomber Command with the aid of economists intimately familiar with the German industrial, economic, and social structure.

KEY:

SUBMARINES · AIRCRAFT · CHEMICALS · VEHICLES · ARMS · LOCOMOTIVES · DOCKS · RAIL CENTER

COAL MINING · HEAVY INDUSTRY · NAVAL BASE · LIGHT INDUSTRY · ELECTRICAL INDUSTRIES · MACHINE TOOLS · R.R. CAR FACTORIES · RUBBER · OIL

OUR FAR EAST STRATEGY

The Liberator and Piper Cub, photographed on a South Pacific Island, show in their tiger-ish mien the spread of a fashion started by General Chennault's flyers in Burma. Panel insert shows Moby Dick's record: 35 missions, 2 planes downed, 3 ships sunk.

By Admiral William V. Pratt, U.S.N. (Retired)

Admiral Pratt is on the staff of "Newsweek"

THE problem of the air bombardment of Japan naturally differs from that of bombing Germany. From Britain to the heart of Germany is not a great distance, and from Italy it may be possible to strike in force soon. But in the Pacific we must still inch much closer to our target.

It is extremely significant that the Russians, leading exponents of land warfare and always insistent on our opening of a western front, should now admit the importance of our strategic bombing of Germany.

This has a bearing on our Pacific campaign, now in its first stage offensively. Most important is today's recognition by the exponents of land and sea warfare that the air arm has its own independent role to play in strategic bombing of an enemy homeland, wholly aside from its contribution to land and sea operations.

If Russia were in the Pacific war, our problem would be simplified, for all of Japan is within a 1450-mile round-trip range of heavy bombers based in Siberia.

But Russia is out. And so is any approach from the Aleutians through the Kuriles — and not alone because of weather. For even if we occupied Paramushiri, in the Kuriles, it would be difficult to hold, without a base in Kamchatka. Further, the round-trip flying distance to cover all of Japan would still be over 3000 miles.

There remain three routes for our bombing approach to Tokio.

The first of these, the so-called frontal attack, would be by sea from a base in Hawaii, some 3394 miles distant. This attack would have to come from aircraft carriers, and there are various objections to this method. For one thing, carriers as units of our Fleet are too valuable to risk in constant bombing attacks until the Jap fleet itself is destroyed. Again, carriers cannot carry and launch the heavy land bombardment type of planes like the Liberator. Finally, carriers would always be in danger of suffering the mass air attack of land planes based in Japan, and the best they could accomplish would be surprise raids, carried out by medium heavy bombers.

The second possible line of approach for us is from India through Burma into China. While the British fleet can support any move *via* the Indian ocean into Burma, it will not be free to enter the China seas

until the Straits of Malacca and Sunda are cleared of enemy resistance. This would require the recapture of Singapore, and the cleaning up of Sumatra and at least a part of Java, before we could supply Chinese bases adequately. This seems to indicate that the main direction of this move would be south. But even with Burma freed, only a trickle of the supplies needed by China could come over the Burma road. The bulk would still have to come by sea.

Possible Route No. 3 — doubtless our most tempting and possibly the best — starts from Australia as the main base. It runs north to the Philippines and then on to China.

Now Australia is an excellent main base. It can be reached by sea from the Indian and Pacific oceans. Equally important, it furnishes sufficient dispersal area to accommodate the mass of heavy bombers necessary for the softening up of the Japanese strongholds. Just as vital, it is the first of many key stepping stones all the way north to Tokio — large island bases where all types of aircraft could be used to advantage. There are likewise many spacious harbors capable of accommodating the ships needed to transport men and supplies.

We have already stepped from Australia to Guadalcanal. From Guadalcanal north to Luzon are many potential bases in easy range of Liberator missions. And from Luzon on to Shanghai is a round trip of only 1800 miles. From Shanghai to cover the main Japanese islands of Honshu and Kyushu and the Inland sea, the round trip flying distance is roughly 2200 miles. From the Shantung promontory it is less, about 1800 miles. To sum up, for the effective heavy bombing of Japan we must hold air bases in China. And to get those bases, and supply them, it is extremely logical to move up through the island steps.

This does not mean we shall want to take every island enroute. We need only enough to give us the stepping stones.

We shall doubtless also be moving simultaneously toward China through Burma. We shall perhaps likewise risk a frontal air assault on Japan from carriers. But the third route before us — the stepping stone route over the Philippines — is not merely MacArthur's dream. There are many strategic considerations to recommend it.

This route will permit us to use in amphibious warfare every resource of our power — including the great four motored land-based bombers that have made history in the air war on Germany.

Today we have only two such four-motored bombers in volume production — the Liberator and the Fortress. Such volume is of course one key to an air campaign. The newly announced Boeing B-29 will hardly be able to stage mass attacks for some time. Hence, in our amphibious operations against Japan, we shall for awhile be relying heavily on familiar models. Thus far the Liberator, because of its range and carrying power, has been doing most of the heavy work in the South Pacific, as has already been published. And both the Army and the Navy have assembled an unrevealed number of Liberators at bases in India, China, Australia, and various Pacific islands — possibly a goodly number, but still insufficient for the work ahead of us. Whatever our approach to Tokio, land-based airpower is clearly going to play an important role in it.

It is almost time for that role to be revealed. As Admiral Nimitz, Commander in Chief of the Pacific Fleet, said late in 1943:

"Our time has come to strike. Our northern flank in the Aleutians has been secured. In the south and southwest Pacific intensified attacks by all forces have placed the Jap in a precarious position. In other areas he has been relatively unmolested. But henceforth we propose to give him no rest anywhere. For two years we faced the necessity of containing the enemy while gathering the strength necessary to drive through to the vitals of his defensive system. Now we are getting the ships, the men and the planes."

Where Our Air Forces Are

At the close of 1943 our production of planes was at the rate of 100,000 per year, or just over 8,000 a month; and General Arnold had announced we were sending to our Air Forces in the war theatres augmented numbers of planes. Although authorities had not so stated, observers could assume most of these to be still going to our forces in Europe and the Mediterranean, with every effort being concentrated on destroying the German war machine by air bombardment before our land forces march in.

Here is where our Air Forces are stationed in the various theatres:

Four of our Air Forces are stationed on this continent, as follows:

First . . . . Headquarters at Mitchel Field, New York. Responsible for the air defense of our East Coast. Under Maj. Gen. Ralph Royce.

Second . . . Headquarters for its I Bomber Command are at El Paso, for its II Bomber Command at Spokane. Trains all heavy bombardment (Liberator and Fortress) crews. Under Maj. Gen. Davenport Johnson.

Third . . . . Headquarters at Tampa, Florida. Trains light and medium bombardment crews, and some fighter pilots. Under Maj. Gen. W. St. Clair Streett.

Fourth . . . Headquarters at San Francisco. Responsible for the air defense of the West Coast. Under Brig. Gen. William E. Lynd.

AIR FORCE	STATIONED	COMMANDER
Fifth	Northern Australia, N. Guinea	Lieut. Gen. Geo. C. Kenney
Sixth	Albrook Field, Canal Zone	Maj. Gen. Hubert R. Harmon
Seventh	Hickam Field, Hawaii	Maj. Gen. Willis Hale
Eighth	England	Maj. Gen. Ira Eaker
Ninth	Middle East	Maj. Gen. L. H. Brereton
Tenth	India	Brig. Gen. Howard C. Davidson
Eleventh	Alaska	Maj. Gen. William O. Butler
Twelfth	N. W. Africa	Lt. Gen. Carl A. Spaatz
Thirteenth	New Caledonia	Maj. Gen. Nathan F. Twining
Fourteenth	Burma	Maj. Gen. C. L. Chennault
Fifteenth	Southern Italy	Lt. Gen. Carl A. Spaatz

PILOT Superstitions

By
William E. Barrett

Flyer in far north, carrying his baby's shoes.

Barrett is Consultant in Aero- for the Denver Public Li- Aviation Book Reviewer for *Boston Post*, and a flyer well n as an author and an author- on the literature of aviation.

WHEN you are foolish enough to ask serious questions during an hour of relaxation around an airport, you get some wonderful answers.

The boys who blamed bad luck on Gremlins probably just started the stories for the benefit of newcomers, and pilots today are sick of the Gremlin legend.

Still, there is something about the loneliness of a pilot's life in the air that contributes to mysticism. Any pilot who has done any appreciable amount of flying can tell strange stories if he feels that he is with kindred spirits. There are cloudscapes of unbelievable grandeur to be seen upstairs; lonely ice fields of cloud, towering castles, mountain ranges, strangest of all, the faces of people cut sharply in cloud shapes.

Some pilots claim that they have seen the same person, or perhaps several people, time after time in the clouds — that there is expression on their faces, and that sometimes these faces warn of dangers ahead. Some pilots have worried when, over a period of time, a certain face was missing. Other pilots, of course, laugh at such fancies as these. And few, even those who believe, will risk ridicule by discussing such matters with any but people they trust implicitly.

If I were to pit science against legend, I would venture the guess that eyestrain on long flights has something to do with the visions that airmen see. But never would I brush such visions aside as mere yarns.

The pilot's superstitions would fill a book. There are few pilots who do not carry some particular object with them on all flights, an object intimately associated with their luck.

Foremost in this field, apart from the inevitable medals and lucky coins, is the doll. Pilots have always been suckers for dolls. (I mean the stuffed kind that a little girl gets on Christmas, not the kind that is whistled at.) If the doll is one that a favorite girl owned and loved, or looks like the favorite girl, that is all the better. Due to pocket limitations, small dolls are preferred to big dolls. And the dolls which have the most air hours are very likely to be rag dolls only a few inches high.

In the first world war, one famed American flyer had a doll made to order whose face was modeled after the face of an English actress with whom he was in love. He scored many victories. On the first flight he ever took without his mascot, he was killed. When men hear those things and know, from unimpeachable sources, that they are true, it is hard to convince them that mascots are only a throwback to primitive witchcraft.

Many pilots fly today with skullcaps made from a sweetheart's stocking. That custom, too, originated in the first world war where stockings were worn as scarfs if not as skullcaps. One important detail to be remembered in that the stocking must be taken from the girl's left leg. There is no luck in the right leg. Don't ask me why.

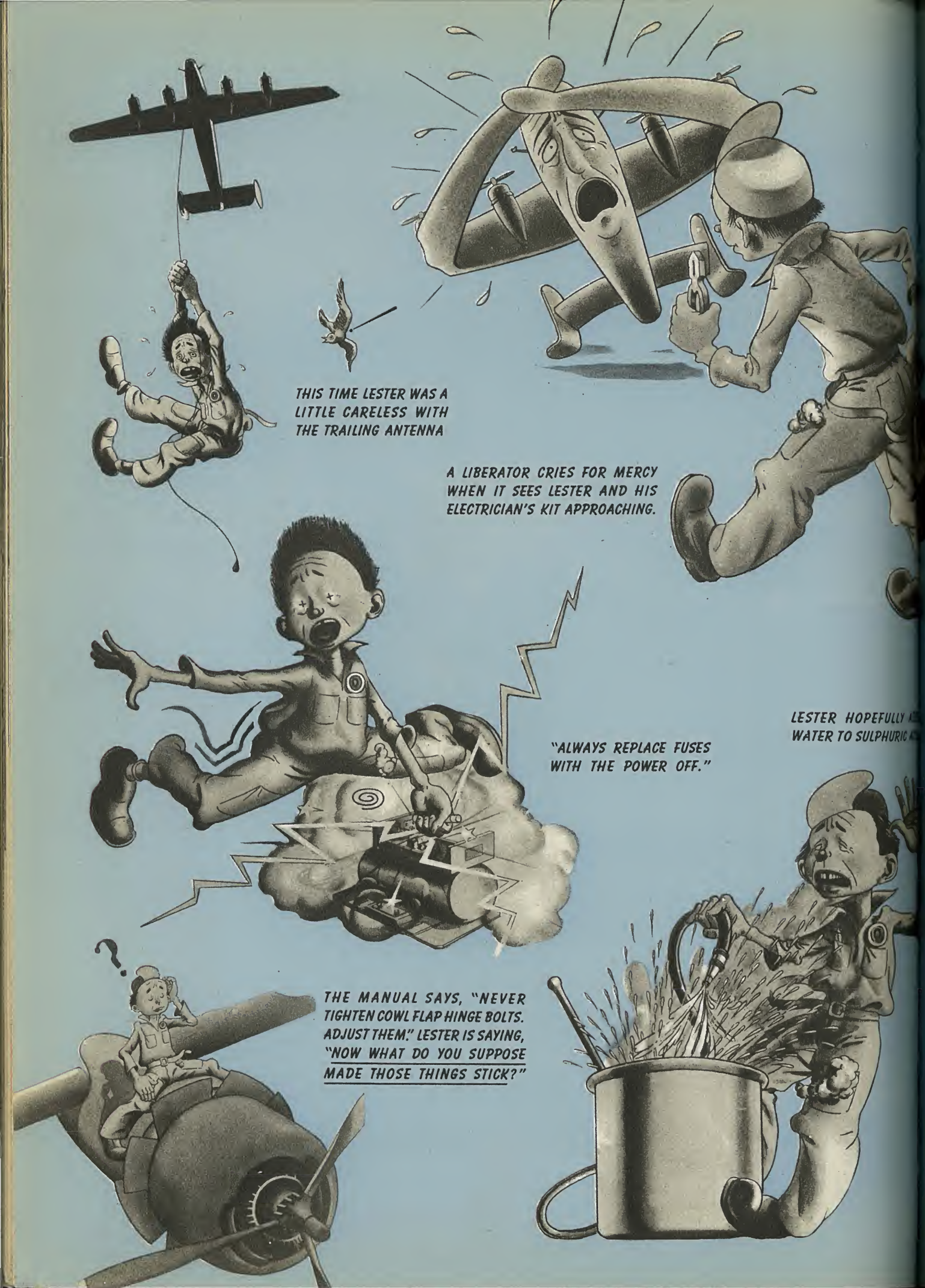
Be careful, if you are seeing anyone off on a flight. You may watch the take-off, but *never* watch the plane out of sight. Turn around and leave while it is still above the airport.

Of course, three lights on a match is an old superstition. Flying men cannot claim that one as their own. But watch this some time, when it is windy around airports: A pilot will try to light a cigarette; he will strike two matches; if the cigarette does not light, he will put it regretfully away and give up the idea of smoking. He will not take the risk of using a third match to light it, because three matches to a cigarette are unlucky. Not all pilots, of course, believe this, just as not all pilots believe the three-cigarettes-to-a-match theory. But a lot of them do.

No pilot with a decent belief in his own destiny will lend his personal helmet, nor allow anyone to touch the helmet that he wore on his solo before he makes another flight. Many pilots will go to great lengths to avoid entering a ship from the right side. A great many will spit on the elevators of a ship that they are flying for the first time. Then there are lucky numbers — and that subject is endless. But most pilots like the number "13."

Photographing a pilot before a flight is one of the oldest hoodoos known to wings. A great many pilots refuse under any circumstances to permit pictures to be taken before a flight. There is a long tradition behind this prejudice.

Baron Manfred von Richtofen, Germany's ace of aces in the first world war, was photographed beside his plane by a new pilot — and he flew out to his death. Captain Ball, who was at the time of his death the greatest of England's aces, carried a double jinx into combat. He was photographed beside a plane on the last day of his leave, and photographed again when starting on the patrol which ended in his death. Almost any airport which has existed long enough to build up a history of its own can supply other stories of the photograph jinx as it acted in times of peace.


THIS TIME LESTER WAS A LITTLE CARELESS WITH THE TRAILING ANTENNA
A LIBERATOR CRIES FOR MERCY WHEN IT SEES LESTER AND HIS ELECTRICIAN'S KIT APPROACHING.
"ALWAYS REPLACE FUSES WITH THE POWER OFF."
LESTER HOPEFULLY A
WATER TO SULPHURIC A
THE MANUAL SAYS, "NEVER TIGHTEN COWL FLAP HINGE BOLTS. ADJUST THEM." LESTER IS SAYING, "NOW WHAT DO YOU SUPPOSE MADE THOSE THINGS STICK?"

AT LEFT, LESTER USES BLACKSMITH METHODS ON DUAL FITTINGS.

The Trials of Lester Boner

LESTER BONER, who's had a try at almost every job aviation can offer and never did anything right in his life, is a valuable man.

Les is the first cartoon character in history to give his life for his country. He does it every time Consolidated Vultee issues a new service manual. Ripped to bits by a Liberator propeller, blown up at least twice by lighted matches, tossed in the vicinity of gasoline vapor, crashed in more airplanes than most people have ever seen, he still survives to be essential. He teaches Consolidated workers and Army airmen how *not* to do things.

Les was not an accidental creation. George A. Pohlman, supervisor of service publications for Consolidated Vultee, wanted something that would put a little snap in his technical books, and artist Richard F. Duggan created the character.

To date Lester has capered through at least a half dozen full-sized books and scores of service bulletins and other trade publications. His career is a standard part of the curriculum of Army Air Force personnel assigned to Camp Consair, special training center for Liberator ground crews.

Reports have it that men studying Consair manuals are scoring ten to twenty per cent higher grades than those who haven't been exposed to the erudite Boner influence.

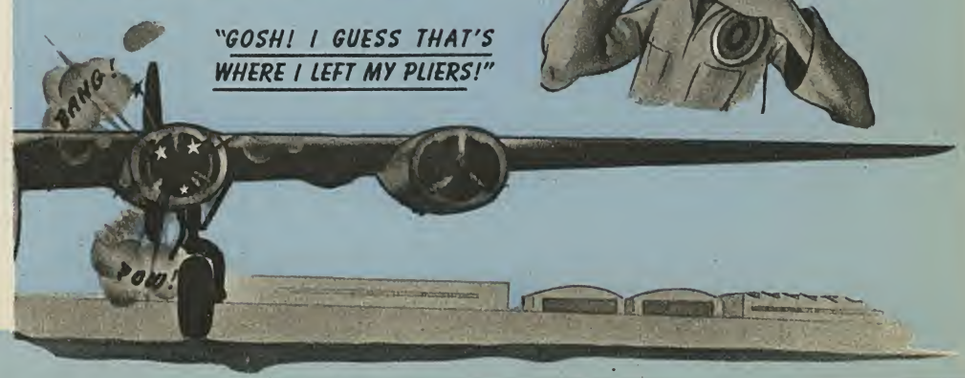
Probably the most interesting aspect of Boner's career has been his influence on staid Army publications, such as the Air Force Technical Orders. Aviation Cadet Knucklehead, a cartoon character of the Army Air Forces, is one of Lester's direct offspring.

"WHEN HE DOESN'T KNOW, HE GUESSES, LOSING LIVES AND MAKING MESSES. THINKS HE KNOWS—NEVER CHECKS—BRAVELY RISKS THE OTHERS' NECKS."

"NEVER USE SEALING COMPOUNDS," SAYS THE MANUAL. BUT LESTER PREFERS HIS OWN PLUMBING TECHNIQUES.

THE MANUAL SAYS, "MAKE SURE EXPANSION JOINTS OPERATE FREELY, TO FACILITATE ASSEMBLY." LESTER WOULDN'T KNOW ABOUT THAT.

"GOSH! I GUESS THAT'S WHERE I LEFT MY PLIERS!"



Enroute TO ICELAND

Ever want to take a flight in a Liberator bomber? Here's the report of a correspondent who did.

By

Fred B. Barton

(by Mail from England)

THE carrier pigeons are the last to be put aboard, in two yellow metal cages which, if need be, can be converted into a floating box and dropped alongside the life-raft. A message of distress is already fastened to the birds' legs; a pencil is taped in place so you can add your location, if you have time before releasing the birds. They can fly homeward 400 miles across open water — you hope that will prove far enough. You hope more fervently that the birds will ride out the trip inside the plane; and you too.

The Liberator bomber is loaded pretty well with sacks of potatoes and onions and crates of fresh vegetables and other items in salvaged packing-cases. The Lib and its crew are on their way back to Iceland, their patrol base. They take their supplies with them. Iceland can produce hot-house flowers and tomatoes, and a little cow's milk. But not much grows there — it's best to roll your own.

You stand politely aside while the boys load in the luggage. Suitcases are poked up through the front-wheel compartment and tucked inside the glass-enclosed nose of the plane. Freight is handed up through the open bomb-bay doors — then you yourself presently stoop low and climb up through the same opening. You won't expect passenger comfort. This plane is built for economy of weight and for efficiency, and for a specific war-time job. It is only by courtesy of the Royal Air Force that you are permitted to go along.

You learn quickly. Look as much as you like. Ask questions — surely; but don't be hurt or surprised if some questions, dealing with intricate devices, are not answered. And don't push buttons and turn levers haphazardly to find out what makes things tick. Some of those innocent buttons release the big bombs, one at a time. Sure, the things are set at safety, and the button won't release them until a further switch is put in contact back inside the bomb-bay. But if you ever want to be invited again, for Pete's sake keep your fingers quiet.

Yet the crew does expect you to look and to show interest. So you walk along the narrow steel catwalk and step high through the door into the rear compartment.

About the most noticeable thing in the rear compartment is the overhead track four of them, loaded with cartridges and feeding to the rear guns of the plane. The tail-gunner will be on the job on this ... ready to act if either enemy aircraft or ... marines are sighted. You think that prob... ably is a good idea. Then you forget ... about it, and you and the crew of seven space yourselves as close as possible to the pilot's compartment for the take-off. The plane is tail-heavy with all that freight ... back, and your human weight up forward helps to balance the plane.

THE bomb-bay doors roll together with the grace and dignity of an old-fashioned rolltop desk. The R.A.F. engineer ... has been idling the motors — No. 3 ... then No. 4 at the far right, then Nos. 2 ... 1. The ground crew are patiently chewing the dust hurled into their faces by the ... stream. They steady the chucks under the wheels until the moment comes to ...

Now the chucks are pulled. The engines roar. You are taxi-ing from the dispersal point onto the perimeter and down the long broad runway.

Presently you are in the air. The two tail-gunners and the navigator move out to find their positions at the guns of the plane and the nose. You and the skipper, the second pilot, the wireless operator and a sergeant who is second wireless operator and mid-gunner, have a little more room to move around in now. Try sitting on some packing-cases for a while. You'd rather stand, would you? Isn't it fun to have windows to look out of, and even that clear plastic dome overhead for an all-around view? Flying across the ocean in the Pan-American Clipper cheated you out of your sightseeing, you remember, because they blacked out the windows whenever you approached a convoy or came in sight of land.

The Liberator takes the air steadily and climbs to 1,500 feet, well under the clouds. Almost immediately you run out of land and are over the open ocean. This trip happens to be from Ireland to a small island, thence to Iceland. You have been told the journey will be broken into two hops because of uncertain weather toward the west.

Without apprehension but with understandable interest you glance around the cabin for the safety devices.

You find several.

The matter of fire has been guarded against pretty well. Small hand extinguishers containing carbon dioxide gas are ready to be directed into any fire at an instant. Other reservoirs, concealed but available at the turn of a button, shoot CO_2 into each of the four engines, should fire ever start there. You've discovered one way in which the stuff they use in soda-fountains has gone to war.

You look out and around. *Up* looks fleecy and inviting and soft. *Down* looks hard and forbidding and cold, the unyielding toughness of an ocean that has had things all its own way far too long to encourage you to drop onto it uninvited.

YOU are heartened to find that the matter of drowning has been given considerable study. The plane itself is a potential ship, once its tricycle wheels have been retracted and the openings sealed over. Too heavy to float long, perhaps. But watertight for enough minutes to let the crew clamber out the upper hatch, lift out a life-raft, release the gas cylinders that give it form, toss out some floating flares, and release the carrier pigeons with their appeal for help.

Here, too, is a Very gun, an awkward open-mouthed affair that propels a burning signal of distress high into the air, then lets it float slowly to earth. Here also are parachutes. Not much good in flying over water, though — safer to stay with the ship.

Comfort is as important as safety, because on long operational flights of 12 to 16 hours a flying officer chilled or in distress could not think clearly or operate his ship competently. So you note small heaters to blow warm air around wherever the crew do their work, and places to plug in electrically-heated clothing, kept safe because the ship's electrical devices operate at low amperage and only 24 volts.

Here too is a place to plug in an electric kettle for boiling fresh water, for the hot tea so indispensable to British flyers. Now that you come to try it, it's not bad for yourself, either.

On any usual flight, you note, there are ample places for necessary crew-members or even an observer like yourself to sit. You note too that sharp corners have been shielded so as not to scratch hands or tear clothing. This U.S.-built Liberator has few of the peace-time comforts that any thoughtful manufacturer will want to build in: no hot and cold running water, not even privacy for the chemical lavatory back there in the waist of this flying warship. Yet your Liberator does conceal some of its wiring and places its mechanism unobtrusively, and at least avoids the stark nakedness of a British-built warplane where everything is right there in the open.

The airplane's radio officer has cheated you out of your usual Sunday afternoon symphony concert, and that is well enough, because he has checked with all the various control stations and verified the plane's location. You're right on your course.

PRESENTLY you come over a small island you faintly remember from your geography book but never expected to see. It is rocky and mountainous and forbidding, but softens into lakes and green trees and farms as your ship moves across. How beautiful and peaceful it all looks! You do not wonder that God came down to earth to create mortals, even with their periodic instinct to fight wars.

They know you're coming, so surely has the plane's radio operator kept in touch with land, both by voice and earphones and by his telegraph key. A small truck stands by to lead you to your parking spot. Planes all over the United Kingdom are stored in the open at what is called dispersal points, it being forbidden during these days of bombs to leave a plane in any hangar beyond the brief period needed for servicing and repairing. Your pilot wheels the plane at right angles to the runway, cuts the mixture to *lean* so the motors can run themselves dry. This prevents any careless touch of a hand, against the propeller of a parked

"The carrier pigeons are last to go aboard."

AAF Photo

plane, from turning the engine over and chopping off a man's arm or head.

The motors stop, and you leave the plane the way you got in. Now how about a hotel?

They have that all fixed.

This war-time stopping-place you've reached is just an assortment of low-slung Nissen or Quonset huts, electric-lighted but without plumbing beyond the iron wash-stand and tin container of water in the corner. The bat-man will bring you hot water when he calls in tomorrow morning to brush off your shoes.

Oh, yes, your shoes get brushed. Warring Britons can do without soap for travelers, without toilet paper in the lavatory (wise persons carry their own) and without butter on the black war-bread at lunch. But not without a man to brush the boots. That is life's necessity No. 1.

You'll have a standard British war-time dinner tonight. It is wholesome rather than exciting. How do you like your kippers? You're lucky if you are grateful and uncomplaining about food. How would you like to have fought through four years of war-time diet? Think of that and don't lament the loss of white bread, and of second portions of meat and milk. After all, this black bread is making British people healthy. You may as well accept your share of health too, no matter how little you like the dry stuff.

Tomorrow you'll be on your way again—off to another island in the middle of nowhere. You decide this war-time travel is fascinating, even with its occasional discomforts. You're learning things.

Inside tail turret, the gunner is pointing to the control for the electrically heated suit he wears.

AAF Photo

THE 10 COMMANDMENTS OF SERGEANT RANGER

The war caught up with him on the afternoon of December 7, 1941, as he was changing sparkplugs on the engines of a lend-lease Liberator on the African Gold Coast. Thereafter he helped get refugees out of Java and the Philippines, on wild shuttle rides to Australia and Singapore; he was later assigned to the plane that flew American officials to the Casablanca conference of Roosevelt and Churchill, and carries a Short-Snorter bill signed by the President; he has seen service in Russia and Egypt and Iraq and most of the strange places of the world.

His name is Sergeant Sydney Ranger, age 25, late of California and now an ATC aerial engineer. Every plane he travels with gets so much of his personal attention that even pilots are in awe of him. Here is his working bible — a group of Ten Commandments he has laid out for guidance in all his operations:

1. **Never take anything for granted. Look sharp.**
2. **When the Liberator is being serviced, check it yourself. The ground crew isn't going to ride on it.**
3. **Beg, borrow, or steal all the spare parts you might ever dream of using, and stow them in your plane before taking off on any long mission. Remember that many things wouldn't regularly be carried in stock at small outlying airfields. Think specially of sparkplugs, fuses, spare hoses and hose connections, spare nose wheel and tube, brake assemblies and brake expanded tubes, starters, and other like parts.**
4. **Remember that necessity is the mother of invention, so keep your wits about you for emergencies. In this war business, expect emergencies as the rule.**
5. **Keep fuel strainers and fuel sumps clean at all times. Clean them out specially at the end of all long trips, and clean the air screens.**
6. **Try to keep as much sand away from the engines as possible. Park your Liberator away from other planes, so their prop wash won't blow sand in its direction.**
7. **Whenever possible, run the engines from 40 minutes to an hour before take-off. It isn't always possible — especially when you have to get away quickly to avoid being caught on the ground by enemy planes. But most of the time you can arrange to do it.**
8. **Specially check all hose connections at every stop. Aeromatic fuel eats away these connections. There's a specially treated aeromatic hose, but while some ships have it, some ships don't. Remember that most fires start in a leaky hose connection.**
9. **Make sure at the end of every long range mission, whether transport or bombing, that your plane is given a 100-hour inspection, even if it isn't due. And run your 25 and 50-hour inspections regularly.**
10. **Look sharp. Never take anything for granted.**

— Reported by Sergeant James Winchester,

Snowplows in the sky

ONLY A YEAR OR SO AGO, air-minded men used to talk about hauling tons of freight by air — someday.

Today they are doing it.

The great planes of the Air Transport Command are flying the global skyways with tons of *everything* our world-based fighting men need so badly — even snowplows for blizzard-locked Alaskan airports, and complete gasoline trucks, cut in half for shipment and welded together again at their destination.

Cargoes flown, with destinations and flying time, have included medical supplies to North Africa, *27 hours* — bomb fuses to Britain, *17 hours* — aircraft engines to China, *37 hours* — blood plasma to Australia, *35 hours* — ammunition to India, *43 hours* — mail to Iceland, *13 hours* — precision tools to Russia, *24 hours*.

The whole story of the magnificent job these airmen are doing cannot be told until after the war. To tell it now — even if we could — would endanger the lives of men and reveal military strategy.

Today these trans-oceanic fliers are making schedules — not headlines. It's a routine job to them — flying each high-priority cargo to the spot where it will do *us* good and the Axis harm.

Often that spot is halfway around the world.

But to Air Transport Command pilots, *no spot on earth is more than 60 hours' flying time* from the military airports "somewhere in the U.S.A." from which they operate.

On their timetables these pilots clock off the Atlantic and the broad Pacific like locomotive engineers. One Liberator Express was in the air only 33 hours and 27 minutes from the time it left Australia until it came down in California. Another flew from Newfoundland to Britain in 372 minutes. And a pilot on the New York-Lisbon run recently made 12 crossings in 13 days.

So it's too late, now, to wonder when the Air Age will come. *It's already here.*

And it's still too early for rash speculation about what the postwar years of the Air Age will be like. Our job today is to win the war so that there will *be* a postwar world worth living in.

But the impact of air supremacy in winning this global war points more clearly, every day, to this fact:

When Victory has been won, air power, in the hands of the freedom-loving nations of this 60-hour-wide world, can well become "the strong right arm of peace."

CONSOLIDATED VULTEE AIRCRAFT CORPORATION has 12 divisions, located as follows: San Diego, Calif.; Vultee Field, Calif.; Fort Worth, Texas; New Orleans, La.; Nashville, Tenn.; Wayne, Mich.; Allentown, Pa.; Tucson, Ariz.; Elizabeth City, N. C.; Dearborn, Mich.; Louisville, Ky.; and Miami, Fla. *Member, Aircraft War Production Council.*

CONSOLIDATED VULTEE AIRCRAFT

DESIGNERS AND BUILDERS OF:

LIBERATOR	4-engine bomber	CATALINA	patrol bomber	VALIANT	basic trainer
CORONADO	patrol bomber	LIBERATOR EXPRESS	transport	VENGEANCE	dive bomber
SENTINEL	"Flying Jeep"	RELIANT	navigational trainer		

From an advertisement of the Consolidated Vultee Aircraft Corporation

LIBERATOR IN AFRICAN DUST STOR

From the Ivan Dmitri Series of War Pictures

The elements in Africa had to be fought alo
with the Germans, were cruel to men and plan
alike. Liberators proved most useful because th
could stand up under these extreme condition

Plane Talk

MARCH · 1944

Easter Express at Air Base in India . . by Ivan Dmitri

Our Flying Spies · Burma Road of the Air · Liberator Men in Britain · Piloting the Rubber Jungles

Plane Talk

If you wish to share your copy of Plane Talk when you are through reading it, you may send it to a friend for 6¢. The simplest way of mailing is to slit a business-size envelope at both ends, roll up the magazine in it, seal and address and put on 6¢ in stamps.

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Liberator Correspondent

Fred Barton, shown here in his correspondent's uniform in London, sent us the diploma pictured below which he received when he journeyed by Liberator to Iceland — a journey he described in January Plane Talk. *The diploma, signed by Lt. Comdr. W. E. H. Miller, U.S.N.R., has had one word censored by the editors, since* Plane Talk *is a family journal.*

Mr. Barton, who served with the balloon division of the Signal Corps in the last war and was determined to have a part in this one, went abroad as correspondent for the American Legion Magazine, *The North American Newspaper Alliance, and* Plane Talk. *He comes from a writing family. His father, the late Reverend Robert Barton, was the author of a popular Lincoln biography; his sister Olive was for many years a newspaper syndicate writer; and his brother Bruce, advertising man and former member of Congress, wrote the famous, "The Man Nobody Knows."*

All Mankind, Wherever We May Be
GREETINGS: Now All Ye Men By These
PRESENTS THAT FRED B. BARTON OF THE
ICELAND AIR DETACHMENT IS HEREBY INITIATED INTO
THE MYSTERIOUS TERRORS OF AND PERVENTORE ELECTED TO

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Liberator MEN IN BRITAIN

Top left: Flying Eight-Ball insignia. Above: Review of Liberator crews in Britain when Brig. Gen. (then Col.) Johnson received the Congressional Medal.

By Fred B. Barton

(By Mail from England)

I'VE just returned to London after four days at a Liberator bomber base in England – two bases, in fact. This theatre of the war has been setting up a new Liberator division. The Libs have been here all the time, except for a diversion to Africa to handle the Ploesti oilfields mission. What is happening now is the arrival of large enough numbers so that Libs can begin to operate alone, rather than as companions to the Forts. Because of some variance in speed, the two don't go together well in the same formation.

General James Hodges, himself a flyer and veteran of several bombing missions, is now commander of the Liberator units in Britain.

Liberators first came to Britain in the fall of 1942, when Brigadier General (then Colonel) Edward Timberlake flew his men over in shiny new B-24's, fresh from the factory. Soon after came Colonel Frank Robinson with his "Flying Eight-Ball."

Brigadier General Leon W. Johnson, recently head of the "Flying Eight-Ball," and now promoted to a larger spot in the same command, is America's first living officer to hold the Congressional Medal of Honor in the 8th U. S. Army Air Force — the big show in the war so far. He is a Kansas man of 39, just now promoted from Colonel to General. He does his flying in person as well as in the briefing room.

Enlisted men in his outfit like him because he never passes anyone on the road — officer or man — without picking him up, if the car isn't full already. When he drove to London to attend an important conference and dinner, one of the army cooks at his mess asked for a ride along to town and back, a four-hour run each way. Johnson said yes; he was glad to have company.

They hung the ribbon of the Congressional Medal of Honor around his neck not long ago, over here in Britain, and almost the same day he received his overdue promotion from Colonel to Brigadier-General.

Only an official few attend the General's

briefing sessions, which outline the day's bombing mission, give the height above sea-level of the target, the route and bombing altitude, and the exact moment at which the enemy is to be presented with a salvo of bombs. Very few ever visit the highly private room, with the wall map three times a man's height, on which appear enemy objectives such as factories and air bases.

IN his camouflaged field headquarters in a corner of rural Britain, General Johnson summarizes our air war progress in short, telling sentences.

"I believe May 14, 1943, was the first big date in our victory over Germany," General Johnson says. "That was the day of the first battle of Kiel. It was the first time Germany had felt our growing power. There had been other raids into Germany. But I believe when the history of this war is written, they'll say the turn of the war came then. We speak now of 'invading' Europe. Well, our air force started the invasion right there.

"In that first mission to Kiel we destroyed the shipbuilding yards, the Krupp Works and the port area. Kiel was plastered by a half-dozen groups of B-17's and a group of twenty-one B-24 Liberators. The target was very well covered with bombs, both H. E. (high explosive) and incendiary.

"That day demonstrated the ability of our air force to go deep into Germany and carry the war home to the heart of the enemy homeland.

"Our next big step was getting our fighters to go with us, to sustain our bombers and to cut down the German fighters. America's fighter planes have repeatedly demonstrated their ability to knock down many more planes than they lose.

"We know that Germany is feeling the effects of our daylight precision raids. They are taking their night fighter planes, as well as their day fighters, and trying to stop our day precision bombing. They wouldn't take their night fighters for day work, if we weren't seriously hurting their factories and their industry.

"I have learned two things in this war. One is the absolute courage of our American boys. The other is what I would call a frightful carelessness of the boys with their lives. They neglect to take care of equipment designed for their protection. They are careless with their guns and with their planes; their preparation for a mission is not as thorough as I would like to see it. Dr. Bruce Hopper, the 8th Air Force historian, says that courage and carelessness are characteristics of American youths.

"These bombing pilots of ours go into battle willingly. Not joyfully, because it isn't the American way to bomb civilians. But they like to go after a military objective, and they like to knock out the target.

"Regardless of their losses, their morale does not suffer at all, *if they accomplish their mission.* But if they lose one plane unnecessarily, that will knock the spirit of the whole group. These lads like to know that they are being used for some real purpose.

"Every American soldier wants to know why a job is being done a certain way. We tell him, because we appreciate he will give us better cooperation if he knows *why.*"

THESE bombing crews are tough. They need to be tough in their business.

Yet, before each mission, each man that is flying attends a brief prayer meeting, right before the briefing. The Protestant and Catholic chaplains take turns. The service was started by Colonel Frank Robinson, now back in the States in command of Air Technical Training. General Johnson, a seasoned Army man, wondered about the effectiveness of these meetings. He knows now.

"The prayer is for one thing only," he says simply. "That we have the strength to conduct ourselves like men, no matter what happens. We know we can't ask God to bless our work for the day. We don't ask Him to bring us back safely, because we know in advance that some men may not come back. But, we hope for the strength to conduct ourselves like men."

General Johnson has great admiration for his ground crews, never cited for bravery, but often doing heroic work in servicing planes overnight, working in the black out and under freezing conditions. And he likes to tell you about the feats of the men who take the smooth-running Liberators forth to do battle against the Nazis.

Major "Johnny" Diehl, of Carlsbad, New Mexico, was a lad who did the unusual. "Twice," says General Johnson, "he saw one of our planes that was wounded and knocked out of formation, and he went down and covered it and mothered it home because all his guns were working and his crew were on their toes.

"Of course, it is against our policy to award medals for acts like that, no matter how brave they are. In fact, we had to call Diehl in and reason with him; had to tell him he weakens the formation by dropping out of line, and that he has got to follow orders, got to maintain the integrity of the group."

General Devers hangs the ribbon of Congressional Medal upon Gen. Johnson's neck

Left to Right: Maj. H. G. V. Hart; Lieut. Col. John E. Nitsche; Col. F. R. Dent, Commanding Eight-Ball Group.

Yet in his heart, General Johnson admires the man and his crew for doing the humane thing, brave and unselfish.

I MET and talked with U. S. Army Air Force colonels, with flying majors still in their early twenties, with staff sergeants as gunners, with repairmen. I met bomber crews who had flown planes in any and all kinds of weather, from 48 below at altitude to well over 100 above on desert sands. Libya, across Rumania, Belgium, Poland, France, Norway, Italy, Albania, Greece, Germany, Jugoslavia and a handful of other countries, these men have flown their B-24's.

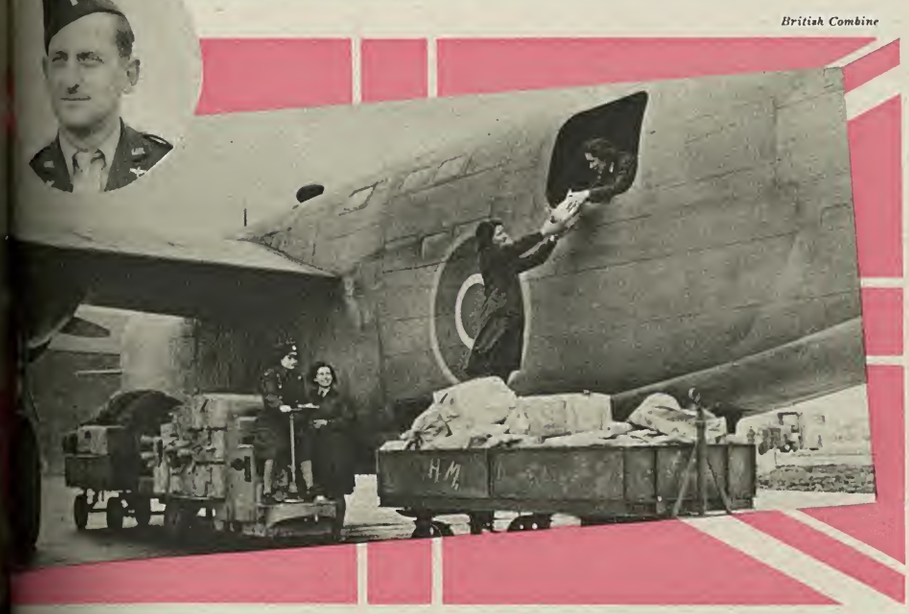
They talked to me. Not so much about themselves, though they are hungry to

sional news about their work and their life flashed to the folks back home. more about the airplanes they fly. To a these bombing crews bragged and sted about their Liberator bombers.

Captain Frank D. Slough (pronounced rhyme with "how") a veteran flyer in both RCAF and USAAF, is a group leader, which means he pilots the lead ship in many berator bombing missions.

"Libs will go faster and further, and with a heavier load," he says. "That's why

Left: Capt. F. D. Slough. Below: WAAFS in Britain load Liberator C-87.



British Combine

we went to Ploesti. No other airplane in the world could do it.

"One time I lost two engines, Nos. 3 and 4 both on the same side. That was over Naples. Those two engines were turning but they weren't pulling very much. So I had all four engines at slow speed and coasted down to Malta. Any bombing plane has the gliding angle of a brick, we say among ourselves. But in a pinch a B-24 will glide to a landing practically with dead engines.

"Some of our B-24's have landed without any power at all. And some have been flown with the rudders almost shot away."

Major H. G. V. Hart of Stamford, Connecticut, intelligence officer of a Bombardment Wing, says: "Not a man here would want to trade his spot in a B-24." Major Hart is the man who designed the "Flying Eight-Ball" insignia worn on the chests of the men in his Bombardment Wing. He adds:

"The Ploesti mission proved the Liberator. Here we went in at zero altitude — planes actually came back with wheat all over the bomb bay doors."

Lieutenant Colonel John E. Nitsche of South Bend, Indiana, operations officer at one of these bomber bases, says we'll be talking about Ploesti for a long time to come. For that one raid gave the Russians so much support in stopping the German missions.

"There are half a dozen reasons why Liberators have not been used so heavily in this particular theatre of war," says Nitsche. "They all boil down to this: Other makes of airplanes can handle the bombing of Germany as well as a Liberator can. But up until now, only a Lib can do the job in the Pacific where the distances are so great."

Colonel Fred R. Dent of Kerrville, Texas, new commanding officer of the "Flying Eight-Ball" group, has an unusual viewpoint on the stuff that is built into a B-24. He was a test pilot on some of the first Libs to roll off the assembly line. That was back in 1940.

AT another Liberator bomber division, Captain Harry A. Cody of New York acts as public relations officer. To him come the daily reports of all the pilots —some secret and highly confidential, for official eyes only; some suitable to be sent home to hometown papers.

"The Navy wanted Libs for patrol duty," he says, "because a Lib is the best anti-submarine airplane there is. As you know, the Navy has taken over the anti-submarine patroling job here, using both land-based planes and water-based planes.

"Production of B-24's couldn't at first catch up. The Pacific and the Navy got the first call, and UK (he meant United Kingdom, or Britain) didn't receive enough.

"Because of that very smallness of number of planes, our B-24's in Britain have done a number of experimental jobs. Some couldn't be told for quite a while, such as the anti-submarine patrols. Many can't be mentioned even yet.

"Also B-24's in this area have experimented in types of formations that could be flown. Also, in maintenance. They have experimented in modifications for this theatre: how to prevent ice from forming on the wings on an early morning take-off; how to prevent frost forming on the windows; and so on.

"The big Bordeaux raid, last May 17th, was a milestone in America's air victory over Germany. That was the longest trip till then. Most of it was over water. We went in one formation, two groups of us, and bombed the submarine locks all to hell. It was the first time we had a chance to show what we could do. That Bordeaux raid, to my mind, was when Libs became of age.

"Then on June 1st they took us off bombing missions and we spent a month here in Britain practicing low formation flying. It was exciting, flying across farms and pastures and scaring the cows, though the farmers didn't like it. Then we went to Africa. From Africa we made our first air raid — on Rome.

"Then after a few more missions into Italy and Sicily they pulled us off operations altogether, and the newspapers forgot us. That was when we got in our heavy practice for Ploesti, there on the desert. That went on from July 19th to August 1st, when we took off for Ploesti. And the rest you know about."

So the story goes. It is the Cinderella story of the war, the way the Liberator bomber has grown to fame. Libs were buried and overlooked by newspaper headlines; they plugged quietly along at whatever job was assigned to them. Now they come back to the big show in Britain in greatly enlarged numbers.

These Liberator pilots and crews have almost a fanatical passion for their airplanes. For their money, they consider the Liberator the war's outstanding heavy bomber.

OUR *Flying* SPIES

A Navy Liberator on Guadalcanal, loaded with thousands of gallons of gas and four aerial cameras, takes off to survey Jap outposts in the Pac

By Tremain F. Robinson

IN today's war very little has been heard of spies like Mata Hari. One reason is that modern aerial reconnaissance is giving us more completely accurate information on the enemy than the spies of tradition ever dreamed of getting.

Our Army and Navy of course do not rely entirely on aerial reconnaissance. They use every means available to find out what the enemy's resources and intentions are. But the air is now almost a dominant factor in Intelligence operations.

Aerial reconnaissance is both visual and photographic, long range and short range. With aerial eyes, our Armed Forces know well what the enemy is doing and will do, what he has to do it with, and when he will act. This is true not only on battlefronts, but on the enemy's home front where he makes his tools of war.

Our airmen are simultaneously keeping track of enemy positions and production, and also doing a tremendous job of mapping. Even in long-surveyed Europe it was found that many maps were quite inaccurate. Countries there are small and their maps do not always jibe. The Allies are doing the mapping job over.

U. S. Navy Photo

Japs attack, and photographer mans gun.

In the AAF, the word reconnaissance is briefed to "recon". The British say "recco".

British recco units pride themselves on being able to get and deliver any picture requested within eight to ten hours. That time is something of a maximum; thousands of pictures are turned out in shorter time.

Our own Navy has developed an on-the-spot sort of procedure out in the Southwest Pacific, which was tried for the first t there in a PBY. The Japs evinced a ha of moving flak guns around day by so that a picture taken one day would pr not too reliable the next. Hence in one our earlier strikes against a Jap airfield PBY crew flew in first to take pictures, veloped and interpreted these in the located the ack-ack installations so could be knocked out immediately, and attack went in at once.

The same principle has been used some of the most recent attacks by land forces on Jap positions. Reconnaissance planes fly over the area, deve pictures while in motion, drop them to land forces to give up-to-the-second in mation on enemy positions as our t move in.

Perhaps even more vital is the recon on a longer range basis for planning future operations. This includes not our planning for devastating air raids for our invasions.

BEFORE an air raid over Berlin, for stance, there must come photo re naissance and interpretation. It is a con

job. Many flights may be made over an area before a bomb is dropped. Skilled interpreters can tell by comparing several pictures of the same object just what is being made, and where and in what volume; can rate its value to the enemy's army; can judge where the bottlenecks are; can even separate dummy installations from the real thing. Such matters determined, the bombs are dropped.

Pictures are taken while the raid is on, for immediate information; reconnaissance planes follow up afterward for detailed information on damage done. Then the bombers can come back to hit what they missed before.

Even when a particular plant or city is wiped out, reconnaissance keeps returning. Often the enemy tries to repair damages. At the appropriate time, when a maximum of work has gone into rebuilding a plant, the bombers return and knock it out again.

Naval officers returning from the Pacific report the same technique in use against the Japs. In the Pacific our recon fliers, using Liberators to a large extent, thought they had noticed something unusual going on at Munda Point. Yet it seemed such an unlikely place for any vital operation that they were doubtful. But they kept watch, and soon decided the Japs were actually cutting an airfield out of the jungle. They started making a photographic record, and maintained it from November 1942 until the following March. After the Japs had struggled with their field to a point where it was approaching usefulness, it was thoroughly and continually bombed. The result was that not a single Jap plane ever took off from that field. It has since been captured by our own forces.

Navy fliers tell, incidentally, how one flight of PBY's went over the field and dropped regular bombs and empty beer bottles. They said the bottles were almost as effective as live ammunition.

Reconnaissance is dangerous and tough even with the best of equipment. In the early days our fliers used whatever came to hand. The first real advance in the Pacific area came with the arrival of a group of Liberators, which did much to improve the situation, and for a while the Navy used them for every type of reconnaissance work. Today the work is being divided.

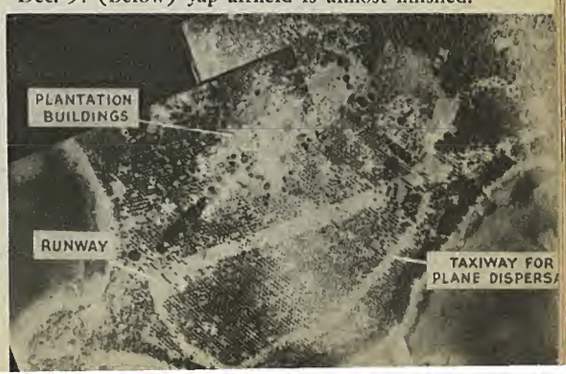
Most startling reconnaissance feat of the Liberators to date was disclosed February 18 in a news report that they had actually photographed Truk, Jap fortress in the Pacific, preparing for our Navy's attack there. Two Liberators on February 4 had made the daring round trip flight of 2000 miles to Truk from the Solomons, loaded with cameras and 22 men, and brought back the precious pictures safely.

Ground crew of Navy's famed VD-1 squadron place K-18 aerial camera in Liberator's camera rack.

Dropping photos by parachute to ground forces.

Nov. 28, 1942: Apparently harmless landscape.

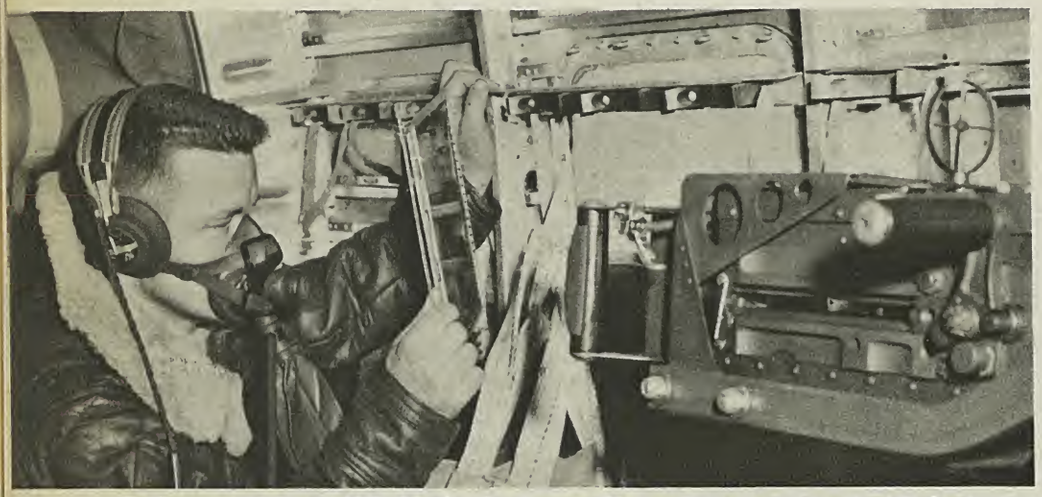
Dec. 5: Beginning of clearing for runway shows.
Dec. 9: (Below) Jap airfield is almost finished.



In the European and Mediterranean theaters, a different situation exists. Our Army relies more on the F5-A, while the British have used stripped Mosquitoes and Spitfires extensively. In the past Liberators have also been flown there often in charting operations where enemy opposition was not heavy.

In bombing, the mission is a success once the bombs are away. But in reconnaissance, a mission is not complete unless the plane comes home with the pictures. Recon pilots do not have guns. To get home, they have to depend on speed. In the fast F5-A's, the one-man crew must be his own pilot, navigator, radio operator and photographer.

"He must combine all the best qualifications of the fighter pilot and the bomber pilot," says Colonel James G. Hall, chief of the Reconnaissance Branch of the War Department.



Darkroom on a plane at high altitude—the photographer wearing an oxygen mask while developing.

He must fend off enemy fighters, and he needs the bomber pilot's persistence and steadiness. He must run his own radio until out of friendly radio range, and then he must do his own navigating.

Once a recon mission is back with its photos, the pictures must be interpreted before their real significance can be known. This is an exacting task, highly technical, and calling for experience and skill.

AN interpreter starts by knowing the scale of the picture, and more or less what to look for. He ends by seeing more than any flier could ever note without a camera. An interpreter can tell whether a ship on the ocean, photographed from miles above, is a cruiser or battleship; can decide what types of planes are on an airfield, although they all look about alike; can determine whether a bit of land is actual or camouflage. From recon photos, interpreters have discovered new types of enemy ships, and have estimated their speed, size, capacity, destructive power and other factors to a degree later proved quite accurate.

Once, for instance, American planes had been flying almost daily over a Jap held island in the South Pacific, on missions to other points. They did not notice anything in particular out of the way about it. But one day, a reconnaissance plane took a picture. Interpreters found a camouflaged ship that, to any ordinary eye, looked like just part of the island. Within six hours after this discovery, the ship was sunk.

Ordinarily, the actual photographing is practically automatic. The danger and skill enter in getting to the right point at the right height and getting back again. The fliers may go over targets at sub-stratosphere level six miles up, or "on the deck," which means as low as possible. Some of the British pilots have called this "dicing"—the words "with death" being implied. The cameras peering out from the planes are operated by an electric switch. Each camera "shot" overlaps the others to produce a continuous mosaic of the area in which a particular mission is interested.

This system, worked out to a mathematical nicety, is also highly valuable in mapping, which is a vital branch of reconnaissance. Mapping by aerial photograph was first started on a large scale a number of years ago when our Department of Agriculture adopted it for use in Agricultural Adjustment programs. In a world as well inhabited as this, it is amazing the amount of mapping that has had to be done.

LIBERATORS have played a tremendous part in this vital job. Three of them—the "Blue Goose", "Sally Lou", and "Old Nick" — are primarily responsible for charting the wildernesses over which the trans-oceanic routes of the Air Transport Command operate.

In this work, the cameras are set to shoot automatically while the crew runs a course which will completely cover, photographically, the area assigned. It may be a few hundred miles long in one stretch, or 1500. The crew know where they start and where they stop, and that is about all. When interpreted, the pictures show the best way for the ATC routes to run, indicate where landing fields can be constructed, and show most of the other factors which have to be known.

For more than a year and a half now these three Liberators have been pioneering in this undertaking. In June of 1942 the planes and their crews were pulled out of bomber squadrons and sent into charting work. The original crews were eventually sent back to combat duty, and the present men took over. They started with portions of Greenland, then followed in Canada and Alaska, then dropped way south to find out what was wrong with the charts of the Andes. After that it was Africa and on to the East. Some of the work they have done and are doing is still unknown, although the good results of their labors are now showing up frequently in the news.

It is almost unbelievable how far some of the best of the older existing maps have proved. A newly made aerial map superimposed on an old one of the same area sometimes makes it seem crazy. Some islands heretofore shown square on the map actually turn out to be round. A tremendous Canadian river was never on the map at all. A mountain's height will be shown to have been listed as 2000 feet less than it actually is. Such inaccuracies may not seem serious. But in a war, they may sometimes mean the difference between life and death for our men, and reports are that some of the mis-information shown on our foreign maps was intentional.

When the pictures are developed, a map is created from them by means of the newly developed "trimetrogon" system. This is an efficient procedure involving highly technical skills.

BILL STOUT TELLS YOU

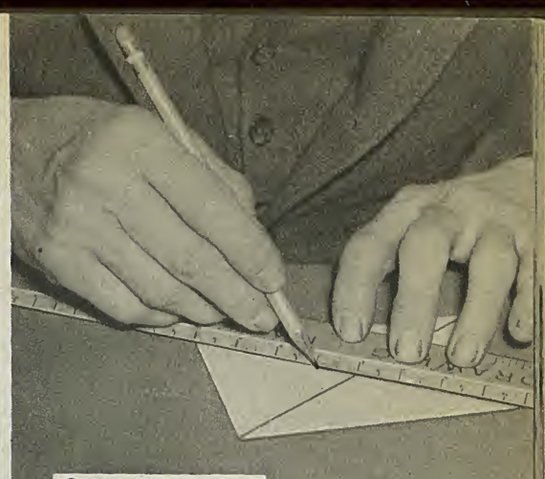
How an Airplane Flies

You can demonstrate how an airplane flies with just a 3 x 5 inch filing card and a paper clip. We'll use the force of gravity as the motor. This simplest of all flying machines will then travel over a hundred times its length, and then make a perfect landing, *if* you know how to handle it. Pictures on this page show you. Start at top.

William B. Stout, one of aviation's outstanding designers, is Director of the Stout Research Division of Consolidated Vultee. He once used the demonstration he gives you on this page to convince 128 men of means they should each contribute $1000 to finance the building of one of his early planes.

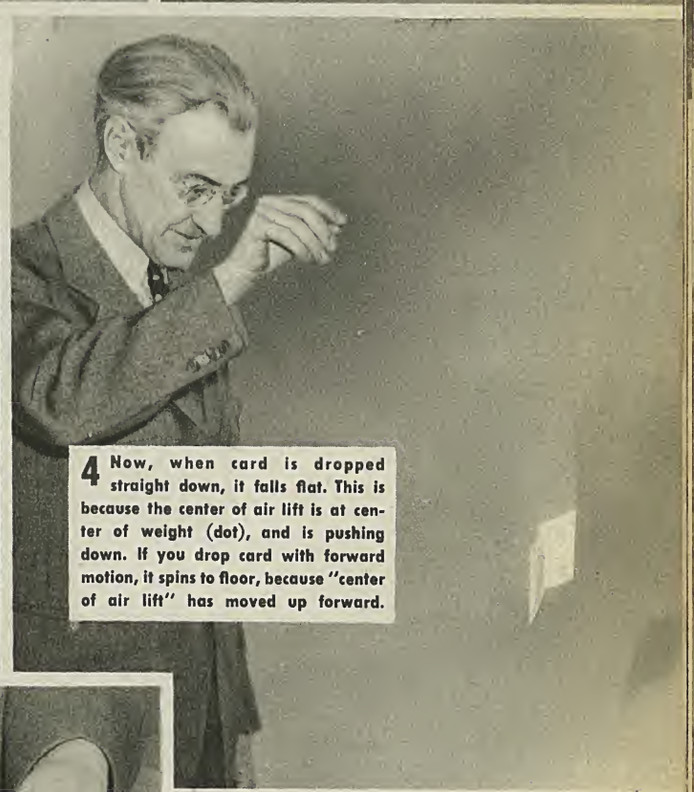
Stout is famous not only for many improvements in airplane and auto design but for an unusual ability to explain things simply.

1 Draw lines crosswise from corners, to find exact center of area (and weight) of card.

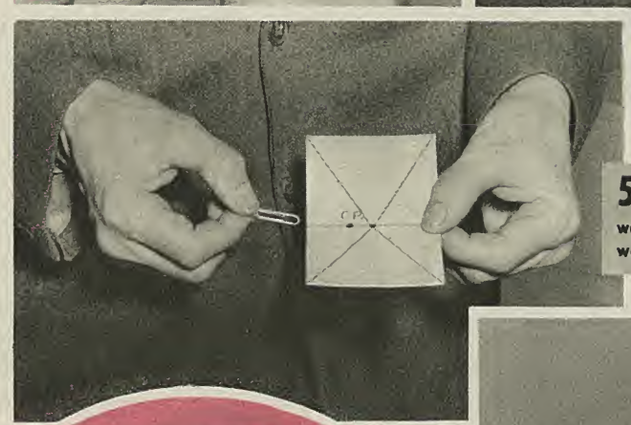


2 Mark center with dot.

3 Bend card at slight angle across center line. To demonstrate that dot is at exact center, balance card on pencil.

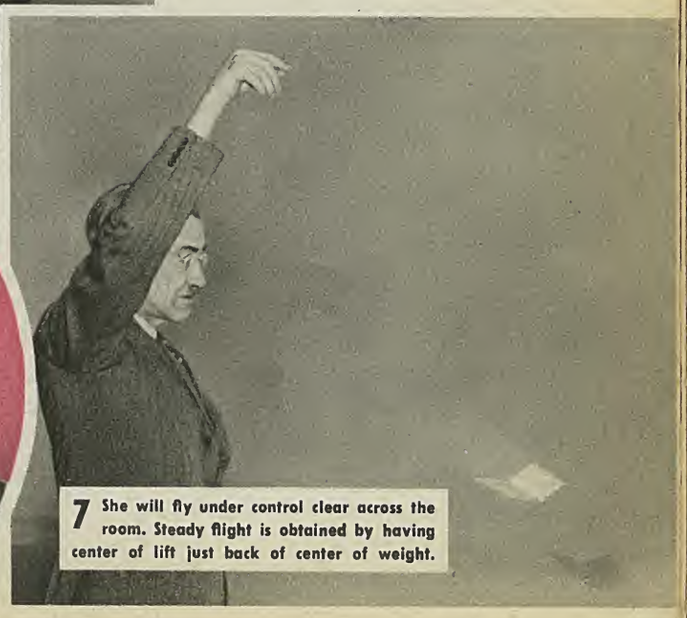


4 Now, when card is dropped straight down, it falls flat. This is because the center of air lift is at center of weight (dot), and is pushing down. If you drop card with forward motion, it spins to floor, because "center of air lift" has moved up forward.



5 (Left) Now fasten the paper clip to leading edge at center line. Adjust the clip so that dot, marked ⅔ of the way back from the front edge, will show new center of weight. Test accuracy by balancing on pencil at new dot.

6 Your flying machine is ready to take off. Hold it as shown here. Then drop, with slight forward motion.



7 She will fly under control clear across the room. Steady flight is obtained by having center of lift just back of center of weight.

AN AIR FORCE ✝ Chaplain SPEAKS

Religion in the AAF is not a formula, but a staff of life.

by Chaplain Floyd W. Cooper

FOR some months now I have been in the maze of islands that dot the vast Southwest Pacific.

The comforts of home and of our Army Camps in the States are now simply memories.

In this far-away jungle, often seemingly so peaceful, again and again men go through the Valley of the Shadow. Here, just as we often seek shelter against the assaults of the enemy, so we have found it necessary to seek the spiritual sanctuary that helps make men courageous and calm when the earth trembles.

In this land men are not ashamed to pray aloud. Across the front of our little, rustic Chapel, I have placed this inscription, "Here Men of Faith Solve Their Problems". We fashioned that little Chapel with our own hands, out of native timber. It is more popular than any in which I have ever served in the States. Men who once went to church only occasionally never fail to attend Chapel now. Many come who never thought religion useful before.

Last Thursday, for instance, during our mid-week service, four boys walked to the altar and enlisted for the first time under the banner of the Galilean. As I welcomed them, I told them that they would become better soldiers of their country.

I always hold Communion on the eve of movements and just before some mission. I shall not soon forget last Sunday. The early morning sun streamed through the cocoanut palms upon the shoulders grouped around a natural-colored kneeling rail. Here there was no rank. A private was kneeling beside a Lieutenant, a Sergeant beside his Captain. Dead seriousness was on the faces to which I lifted the cup that all shared together. Several remained kneeling after the Benediction, until confidence and assurance were theirs.

When the bombers and fighters take off, whether at dawn or in darkness of evening, some Chaplain is there to bid them Godspeed. When those planes return, sometimes depleted in number, the Chaplain is there to welcome them back, to thank God for those who return, to pray for the men who didn't, and ask comfort for their loved ones.

I have seen tears stream down the disciplined faces of the living as we paid last honors to our soldier-dead. When I have had the sad duty of laying fine young men to their last rest under the palms in this far away land, no taps were sounded. No flag draped the quiet forms. At the front we must carry on with what we have.

At our field hospitals, the medical officers, when they can be spared from their urgent tasks, join with their enlisted personnel and patients.

I have stood by these same doctors, gathered around an operating table, and watched the anxiety on their faces as they probed for the deadly shrapnel in one of our buddies. I have seen their faces as a life slipped through the skill of their fingers out into the great beyond.

Recently I watched five of them work three hours trying to sew together a badly mangled body. Amidst the crisp orders from the medical officers for scalpel, forceps or sponge, the soft voice of the Catholic Chaplain beside me could be heard giving the final rites. Silently I prayed for those who loved this lad, and would not see him again in earthly life.

In my talks to my men, I have emphasized again and again that there is something bigger at stake in this conflict than the life of anyone of us, or the part anyone of us plays. We are fighting to preserve a way of life which enriches and enlightens the soul and faculties of men. We are fighting for a kind and quality of life — not just for ourselves, but for future generations. That religious faith is basic, in any civilization that has permanency and is worth while.

Catalina being used as transport in Brazil.

PILOTING THE Rubber JUNGLES

Catalinas are helping in our important experiment of developing South America's rubber resources.

By S. Burton Heath
NEA Staff Correspondent

I WENT to Brazil and Bolivia to find out why we are not getting more natural rubber from South America.

With all the enormous development of synthetic rubber in the United States, natural rubber remains indispensable to the conduct of the war. For there still are certain vital uses to which science has not yet been able to adapt the plastic known as synthetic rubber. One of these is for that part of a tire where tread joins carcass. There the rolling tire generates more heat than synthetic rubber can withstand. This is not too important in tires for passenger cars. But it is fatal on heavy duty casings for trucks, buses, tanks and big planes whose tires must sustain huge loads at high speeds.

We should have 100,000 tons of natural rubber each year. We *must* have at least 50,000 tons. For this we rely largely upon Mexican guayule, Haiti's projected cryptostegia, Liberian and Amazonian hevea.

There are enough rubber trees in the Amazon basin to provide us with five or six hundred thousand tons a year. But we have not been able to get more than an annual 23,000 tons from there for the United States.

In order to learn why, I went down to the Amazon for a first-hand look. I had to visit that jungle hinterland where millions of rubber trees grow wild — where lonely seringueiros travel dangerous trails to tap the trees, gather the latex and bring it back to their homes to smoke it into rubber. The raw gum is then carried to Belem in slow river craft to be graded, washed, mangled, baled and sent on again to Akron, U. S. A.

That is how I came to be flying with Pancho Ramsey in his PBY freighter far in the interior of South America, where tourists do not go.

Pancho is director of the Rubber Development Corporation's South American aviation service, and its chief pilot. He has four-man crews manning his big PBY's, which are used mostly for cargo transport. A couple of smaller passenger planes are also in service.

The operating headquarters are at Manaos, rubber center for the entire Amazon basin, a thousand miles up from the Atlantic; an excellent airport was nearing completion when I arrived. Belem, near the mouth of the Amazon, also has a fine field, and both have good provision for water landings.

But the thirty interior rubber operating centers that Pancho and his men visit regularly are decidedly semi-pro in their airfield accommodations.

The flying is done over wild jungle country, where there are no directional radio beams, no emergency fields. The ground facilities resemble flat pastureland, with misplaced gasoline pumps. There are no lights for night landings or takeoffs. Water landings must be made on the treacherous surfaces of rivers spotted with half-hidden rocks, and often encumbered with floating logs so heavy that, almost completely submerged, they are hard to spot from the air.

There are no servicing facilities except in the headquarters airports. There are no ground crews, no crash boats, no fire equipment, no ambulances. Indeed, there are usually no hospitals, and often there is not even a doctor within many long miles.

It is pleasing, in view of these circumstances, to report that in about a year Pancho and his fellow pilots have flown more than 7,000 hours, mostly over this god-forsaken landscape, without any noteworthy mishap and without so much as an engine failure.

We pulled off the Rio Negro at Manaos, stopped briefly at Porto Velho on the Rio Madeira, and went on to Riberalta on the Rio Beni. Thence we took a side trip to a rubber seringal named Conquista on the Madre de Dios, where Pancho made his twenty-third pioneering landing on uncharted waters without any protection for crew or passengers except his own skill, experience and intuition.

That landing and takeoff deserve brief description because they are typical of conditions under which Pancho and his men operate regularly.

Conquista is only 70 miles overland from Riberalta. Yet up to the time of our trip there was just one way for Carlos Seiler, its owner, to get there from his home in Riberalta. There are no roads. Riberalta doesn't even have streets, because the only wheeled vehicles are ox-carts pulled by zebu. Hence, to reach Conquista, Seiler must travel two days down the Beni and back up the Madre de Dios; to get home again he has to go three days down the Madre de Dios and up the Beni. We ourselves flew over in about 45 minutes, including the more than ten minutes that Pancho circled searching for a usable landing spot.

No plane ever before had landed in the vicinity. Pancho had no forewarning on what he would find. There was no dock, so he drove the PBY into a mudbank to let us climb out of the nose hatch and step ashore.

While we visited the seringal, a swift current swung the plane until the right pontoon lodged firmly in the mud. When it was time to leave, there was no boat — not so much as a dugout — to haul the PBY off the bank. Every time natives on shore pushed the right pontoon loose, the current swung it back.

I don't know yet how Pancho got us free, and I doubt that he does. He tried everything suggested by his jungle experience, and then he tried everything else he could think of, while a score of scantily-clad men clambered around in the offshore water trying to help. Finally, when it looked as though we might not get away in time to land before dark at Riberalta, something gave and we were off.

That was an experience for me and I suspect it would be for most Americans. For Pancho it was all in the day's work.

Seven thousand hours in the air without an engine failure may not seem like much here at home, where every facility for thorough servicing is available. But the work down there is done under obvious difficulties. Mechanics and equipment and spare parts are available only in central locations. The men who do the work have to battle flies, malaria-bearing mosquitoes, redbugs that bore through the skin and deep into the flesh, marihuis whose painful bites last for a week. They eat monotonous and often unappetizing food such, for example, as the xarque or jerked beef that comes in bales like hay and smells to highest heaven. Disease is rampant, and the loneliness is dreadful. Small wonder the turnover in men is enormous — Pancho says about 70 percent.

Yet aviation there is so valuable that it must go on. And it does. But for Pancho's planes, we could not have obtained even the 23,000 tons of rubber we did get there last year. Given more planes, Pancho believes that we might have got around another 10,000 tons.

"Air transport probably is the decisive factor in getting out more rubber," Pancho told me one evening over cold Bolivian beer in his hotel room at Cochabamba, 8,300 feet up in the Andes.

The Catalina in which the author flew the jungles and (in the circle) Pancho Ramsey, who piloted

"If I could have got the planes I wanted I would have had a surplus stock of a hundred tons of food in the back area. Now with the dry season on, the seringueros aren't working, and we have lost a lot of rubber because of that.

"Air transport is for places where other transportation is not available. The real function of our planes is not bringing rubber out, as some seem to think. We do that when we have spare space. But our real job is taking food in so that the seringueros won't have to quit work and go out hunting monkeys and parrots to keep from starving."

Supplies and equipment also must be kept moving. Not only are river boats

slow, at times, to meet pressing needs, but they are expensive. There are runs in Amazonia on which Pancho figures he can deliver freight in his PBY's for $25 a ton less than it costs by boat.

The planes are useful in other ways, too. As an example, when an operating center was established at Guajara Mirin, Bolivia, formerly the most unhealthful community in South America, Pancho flew in pre-fabricated homes for the staff, in sections that could be put together by unskilled native help. He is proud of that job. "There'd be no staff houses if it weren't for our planes," he says.

To keep 'em flying under Amazonian conditions calls for hard, tough fellows who fear nothing, respect very little and can take it."

"I have a hard time getting pilots, and keeping them," Pancho told me. "They can't stand the food and the conditions, the tension and the absence of women.

"The State Department won't let the best type of pilots, for my purpose, come down here. I mean the ex-rum runners of Prohibition days, who can fly under any sort of conditions. I could use a bunch of them."

PANCHO himself never was a rum runner, so far as I have reason to suppose. But he came into aviation the hard way and, though he's far from a tough guy, he's hard as nails and well able to take it.

He is tall, but so broad that he looks almost squat and it's all hard muscle, with no loose fat. He takes off his hat in dining rooms and such places, but seldom otherwise, unless in bed.

He was born on a Texas ranch and christened Vernon, but he quickly acquired the nickname "Pancho" from his father's intimate and frequent house guest, the Mexican bandit Villa.

When Pancho was fifteen his father sent him to California with a load of cattle. Among other accomplishments the boy was handy with the rope. He entered rodeos and won himself $800 in prize money. Then taking a ride with a peripatetic flier who was thrilling passengers at Salinas, he became enamored of the air, and inquired: "What will you take to teach me to fly?"

"How much have you got?" demanded the pilot.

A bargain was struck at $600. For this Pancho was given 80 minutes of dual instruction and turned loose to solo. He did so well that his teacher farmed out to him a job herding ducks off rice fields with the plane.

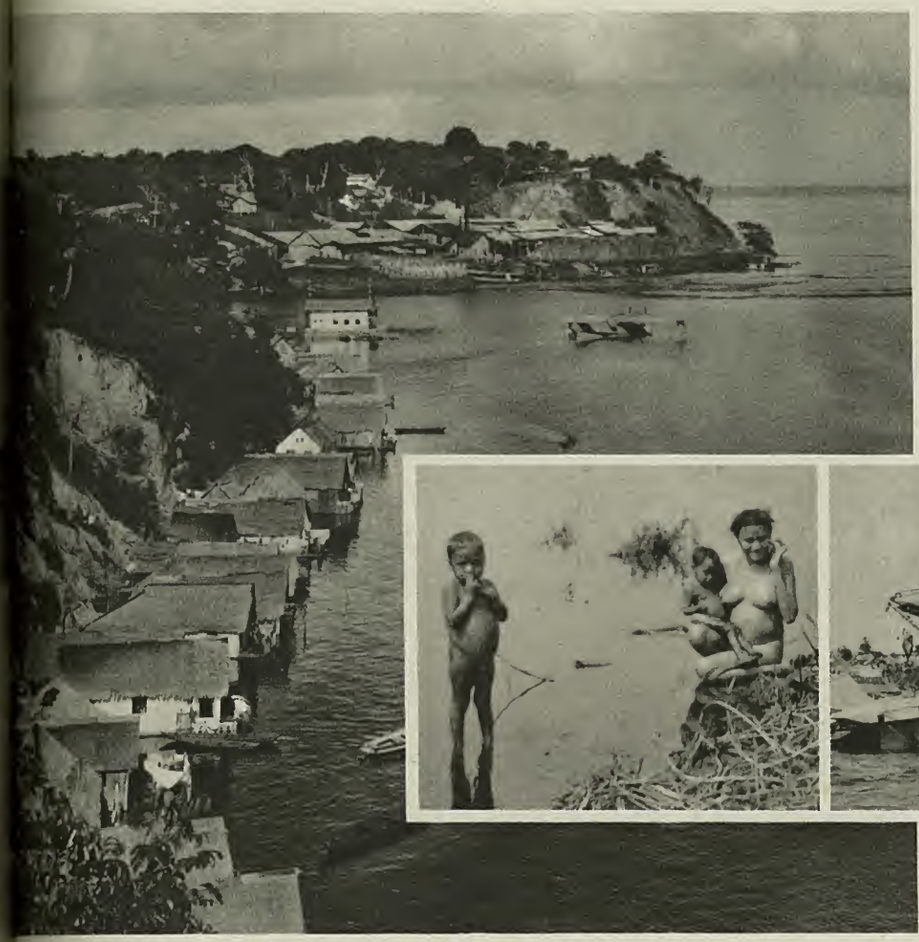
Julian Bryant Photo

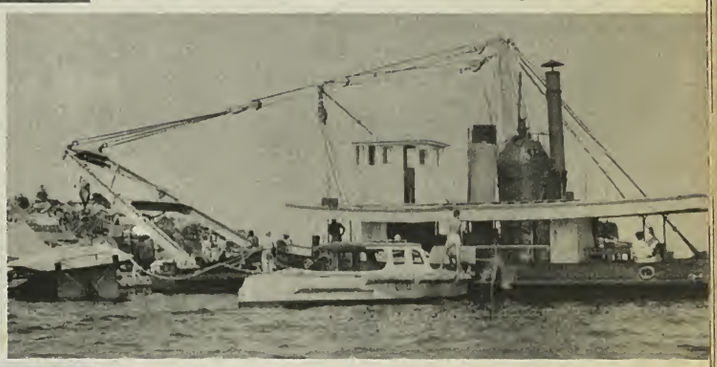
Having piled up 300 flying hours there, he spent three years in the Marines, a year pioneering in Alaska; founded the Lone Star Airways in Texas, sold out to Braniff and flew eight years for that outfit; then was with Pan-American-Grace for almost two years before he took over his present job. Among other accomplishments, he has flown back and forth across the Andes 170 times.

Pancho Ramsey and men like him hold in their hands Amazonia's hope for the future.

There never can be roads or railroads to serve most of the three million square miles of the Amazon basin. River boats have proven themselves incapable of doing the job satisfactorily, though they always will be a major factor in both cargo and passenger transport.

If ever the rich resources of Amazonia are opened up, it will be because aviation can provide speed, comfort and versatility to complement the stolid virtues of that river traffic which formerly was the jungle's only tie with civilization.





Left to right, the harbor at Manaos, Brazil, with a Catalina at anchor; typical Amazon natives; and a river boat that hauls rubber down to the sea coast.

Valiant Basic Trainers

MADE at Vultee Field, California, Valiant Basic Trainers have given scores of thousands of Army and Navy pilots the flight training that prepared them for operating bombers and fighter planes. In early 1944 the Training Command announced that the AAF since 1939 had trained 100,799 pilots, 20,086 bombardiers, 18,805 navigators, 107,218 aerial flexible gunners, as part of an air force now the world's greatest, numbering 2,300,000 officers and men.

BASING OUR *Airpower*

How Our Army and Navy have worked together building our global system of air bases at breathless speed—and how bases are serviced and maintained.

GENERAL GEORGE once pointed out that laymen are inclined to think of an air route as simply a sort of corridor in the skies, through which the planes fly. Actually, of course, it is a system of air fields and bases. Know the bases we shall use in the post-war future, and you know our post-war air routes. Know what bases we aim toward in the Pacific, and you have the secret of our air route to the heart of Japan. Modern war, as General Arnold has said, is war for such air bases.

Now these bases are not simply a matter of a few acres of land, duly treated to make airplane take-offs and landings possible. They are elaborate and protected oases of supply, to which aircraft can return time and again for renewing power.

The well developed air base will contain a control tower; shops equipped with America's newest and finest machine tools; a kitchen and mess hall; huts or tents with bathing facilities; emergency hospital; recreation facilities; hangars for repair purposes and maintenance. Such a base, incidentally, can not be completely camouflaged. Dispersal must be relied on for protection.

As just one example of the supply problem, General Arnold has cited the fact that over 150,000 different items of maintenance and supply must be kept on hand at bases, to enable a modern air force to operate. Required supplies could not possibly all be brought in by air. It has been figured that to ship 100,000 long tons monthly to Australia would require over 10,000 four-motored planes in constant operation; 44 ships will do an equivalent job. That explains why ships are so vital to our airpower in this war.

The business of supplying the Army Air Force bases with all their supplies, ranging from needles to bomber wings, is in the hands of the Air Service Command. Major General Walter H. Frank is the Commanding General. Headquarters are at Patterson Field, Ohio. The General has under him several thousands of officers and enlisted men, and some 300,000 civilian workers. ASC warehouses contain more than half a million different kinds of items used by our Air Forces. In size and scope of operations the ASC dwarfs the largest of commercial enterprises. For instance, a national mail order house, to which the ASC has been compared, currently carries 40,000 items in its stocks.

Orders are received not by mail, but are relayed by the greatest teletype service ever created.

Freight that must be delivered in a hurry is flown. The shipment of domestic air

Natives in India building a base for our planes.

Dmitri Kodachrome

Chinese Airport: Manpower combines to make a human tractor for dragging the weighted roller that levels the ground, then crushes stones to rubble

freight is carried out through the 39th Air Freight Wing which, under ASC authority, runs a 50,000-mile system in this country. It has domestic freight terminals at 117 points, can get urgently needed material to any place within the country in a few hours. Sometimes days can be saved by flying supplies to the coasts, where they are transferred to boats. If utmost urgency exists, they can be flown direct to any part of the world. An air cargo shuttle service has even been inaugurated between Patterson Field and India. Liberator express planes are used for the service, and the 28,000 mile round trip flight is made in twelve days, allowing for stops.

The ASC is also responsible for the job of plane maintenance, keeping planes both at home and on the fighting fronts in combat and flying trim. Its efficiency may be measured by the fact that at the end of 1943 less than 4 per cent of our aircraft overseas were grounded for lack of parts — a record low, and actually less than the domestic figure.

The ASC distribution system at the great depot at Middletown, Pennsylvania, is typical. At a base somewhere in Africa a plane needs a part. Stores in Africa, England and elsewhere have been quickly searched, and the part not located. The order comes to the United States, and the part is found in the Middletown depot. It is flown out on an A priority.

At Middletown are enormous U-shaped warehouses; two lines of railroad box cars can unload at one time. Incoming orders are quickly packed, sent out to the loading platforms, transferred by electric elevator trucks to waiting Liberator express planes. Every box loaded is marked with a priority letter, and A goes first.

THE bases all over the world that are maintained by this giant distribution system have been seized almost overnight from the desert, the sea, the wilderness, and sometimes from the enemy.

When war caught us in unpreparedness — not the Air Forces, which had long pleaded for funds, but the people — bases were an immediate need.

The Navy called for civilian workers, rushed them to outposts, later organized them into the Seabees. The Seabees today are combat construction battalions, often work under fire, are trained to use anti-aircraft guns and light arms for protection. There is much humorous rivalry between Seabees and Marines. Raymond Clapper, just before his tragic death in February, told how the Marines at one post put up a sign: "Seabees under 55 not admitted." The Seabees declare that when the Marines land, they often find Seabees on hand to greet them.

The Army Air Forces have used many sorts of diverse talent to get the required bases built in record time. There is no demarcation between Army and Navy base-building territory — each handles the job where it happens to be. In general, there are two types of Engineer troops that do the Army's base building. The Aviation Engineers, under the Air Forces Command, are all equipped for combat, and are trained to do the specialized work on airfields. Ground engineers—General Service Regiments under the Theatre Engineer — are concerned with the building of ports, camps, hospitals and roads.

Sometimes, as in Alaska, private contractors move in behind the military forces and improve the first installations, working under the supervision of Engineering Officers. In secure areas, such as England, a combination of civilian and military personnel has been used on base construction.

Coordination of all available forces is the guiding principle. The Theatre Commander can order any construction troops in the Theatre — whether Army or Navy — to work on any job required.

Ferry bases across the South Atlantic were built by private contractors under Engineering supervision, and so were some of the Pacific bases. In various spots in the Pacific Islands, and the Far East, we have used native labor under arrangement with the local governments. Thus ferry bases in India were built by the government concerned, who let out contracts to native organizations, with some help in the forward areas from American Engineer Troops. Indian native labor has been used to the fullest extent in providing airdromes for the joint use of British and American.

In lands like China, where there has been no possibility of moving any large number of American troops because of the difficulties of supply, the bases have been built by native labor paid by the Chinese government, with the United States setting the construction standards. In Australia and New Guinea, natives are organized under a unit of the government which administers to their needs, keeps them from being

exploited, and at the same time makes them available for military uses.

In islands and wildernesses where civilization's ways are only now penetrating, the workers are paid by trinkets more valuable to them than the money prized by the civilized warriors. Money only has a meaning if a market can be set up where goods are exchanged for it. Knives, hunting and fishing equipment, and ornaments, are often considered worth working for. In one part of the South Pacific a native will work a month for a "gold-lip shell," which is worn around the neck. Glass beads and other shiny adornments are likewise esteemed. Salt is often accepted as desirable merchandise. Tobacco—the white man's habit — makes habitués quickly and is a universal medium of exchange.

MOST of our bases, at least in the beginning, have in no way been built for permanence. The chief object was emergency speed. In the flat African desert, it was only a few days, from the time the Engineers started, until the planes were landing and taking off. In the jungles, much longer time may be required.

Laboring in the jungle under adverse conditions, a battalion of some 800 men might need as much as four months to complete a strip with taxi ways, dispersal points, personnel shelters, and all operating accessories. It would take at least two Liberty ships, or equivalent air transportation, to haul the first requirements until a supply system could be set up.

But often the work is pushed at seemingly impossible speed. Within eleven weeks our Army engineers and their contractors had built and put into operation a chain of island airfields in the Pacific extending from Honolulu to Northern Australia, by way of Christmas, Canton, and New Caledonia. Flights of heavy bombers were using part of this route within a month after the operation's start.

A field for fighter planes, requiring less work, can be set up in less time than one for bombers. Strips for bombers require much heavier construction, need runways five or six thousand feet long — about a mile.

The introduction of the portable steel landing mat, now used in all war theatres and by all our allies, is one of the outstanding developments of the war. It has done much to speed up the job of building landing fields, and the steel strips are considered worth many times their cost. By the end of 1943, 175,000,000 square feet had been sent to the combat theatres, and 300-000,000 is on order for 1944. Some 60,000 pierced sheets, weighing nearly 2,000 tons, are needed for a runway 150 by 5,000 feet.

Much of the work has been done under enemy fire, and oftentimes it has been started by air-borne equipment. In his magnificent report to the Secretary of War, at the end of 1943 — a report every American can read with pride — General Arnold described one such operation as follows:

"In the offensive on Lae (in New Guinea) we had to build three strips in the mountains within fighter range of that Japanese concentration. We picked a site on the basis of aerial photographs, and a party of American aviation engineers made a long overland journey to reach it. With the help of natives they cleared enough ground to permit our transports to land. Then our C-47's ferried in an air-borne engineer battalion. It required over 100 C-47 loads to accomplish the transfer of the Unit with its minimum equipment. In addition, an air-borne antiaircraft company had to be brought in for protection of the field. This was the way we built our Marilinan field in a month's time. Marilinan paid for itself in one quick series of missions. It was a staging area for the striking force which, from August 17th through the 21st, destroyed or rendered unserviceable 309 Japanese aircraft at Wewak."

In establishing an air base under enemy fire, or in developing a field of the enemy that has been seized by paratroopers after our bombs have largely destroyed it, we have equipment that enables air-borne engineers to come in right on top of the paratroopers.

It is small, light, specially designed for air transportation. It includes portable hangars, a road-scraper that can be hauled by a jeep, rollers that can be filled with water or sand, a gasoline operated lighting unit for night construction work and night take-offs and landings. The unit of air-borne engineers is similarly "streamlined," and consists of some 500 men. It takes about 80 planes to get such a unit started.

How many bases we have throughout the world will doubtless not be revealed. Nor will their total cost ever be calculated, because it is incalculable. Whatever the cost might be, it is infinitesimal compared with the vital importance of the airpower that has been erected on it, and the role this airpower is playing in safeguarding our nation's life.

Servicing Liberators for their flight over the Hump from Assam, India, to Kunming, China.

Most base installations in east India are built without nails, of bamboo and thatching. (Below) Newly arrived airmen at billet, awaiting belongings trucked from the airport.

Burma ... of the

The flag on his back might save a lost airman.

IF you lay out your right hand on the table, palm upward, with fingers closed and thumb outstretched, you have a very rough map of India. The thumb will be Assam, the narrow eastern province that reaches out and touches China. Most of Assam is low and flat, and the great Brahmaputra River that drains through it spreads out like our lower Mississippi.

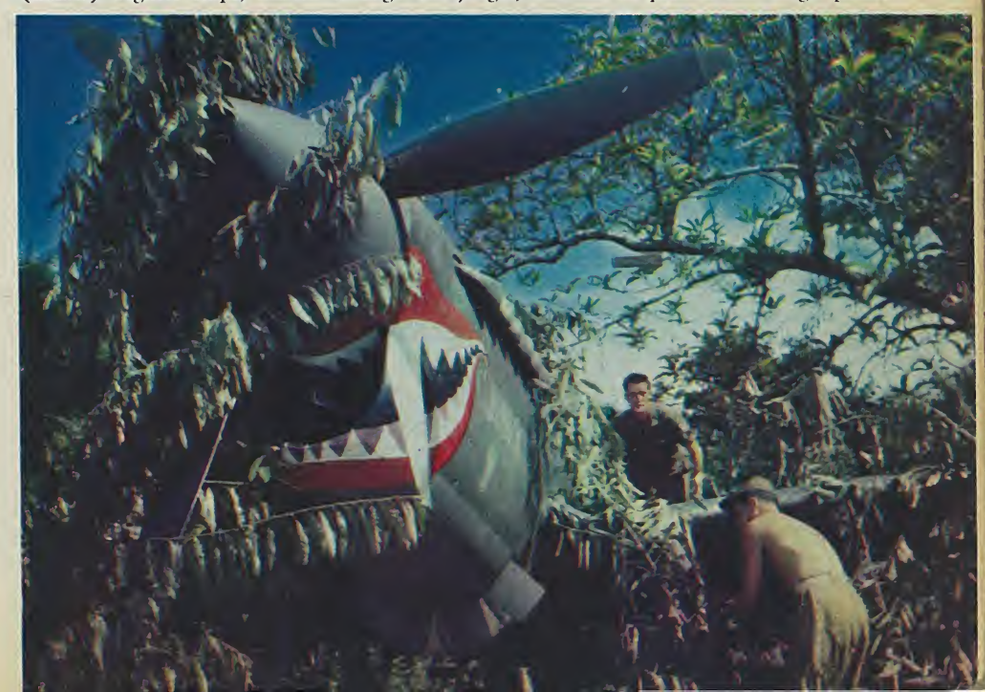
But suddenly rising at the tip of the thumb are the great Himalaya mountains, where the lowest peaks are higher than the tallest of our Rockies. These are the great walls that must be leaped, to pass between India and China. This is the "Hump" that all flying men from the Far East theatres speak of with such awe. Over this we are flying supplies to our bases in China.

From Assam in India to Kunming in China is only 250 miles. But the route is

a Road the Air

Liberator Express flying the Hump, where the lowest peaks are as high as our highest Rockies.

Fighter pilots, linked by communication networks, await signal to meet attacking Zeros. (Below) Fighter ships, hidden through the jungle, sail out to protect our cargo planes.



Kodachromes by Ivan Dmitri
Drawings by Lt. Allan Kass

over mountains that rear themselves three miles high in the air; and if a plane, having climbed far enough to clear these, gets off its course however slightly to the west, it may crash into the sides of still greater peaks that line the three-mile high "pass."

Some devout Hindus themselves have long believed that certain of these Himalayan peaks were the abode of sacred spirits girding themselves with the winds on the heights of the world so their lofty retreats can never be violated by man. Legend has been built around them in India's philosophic literature for countless generations. A little of this was reflected in James Hilton's *Lost Horizon;* the Shangri-La reached by the lost air-travelers was on a fabulous ledge in this very Himalayan fastness where India, Tibet and China touch the top of the world.

The air-valleys between the desolate white peaks are filled with eternally swirl-

By E. Franden James

Lieutenant Allan Kass, now with a Liberator group in India, shows crewmen interrogated after a mission. Note plane models for identification.

ing mists and roaring winds. A plane falling here could probably never be found, whatever the signals its slowly freezing crewmen managed to send by radio. Planes that have survived have picked up, on their radios, the voices of American crews hopelessly lost in blizzards at 20,000 feet, facing certain destiny by singing, just before they crashed.

Eric Sevareid, CBS correspondent who was on a two-motored plane that cracked up en route from China to India, was able to survive with his companions because the plane evidently had drifted east over Burma jungle country. Some parts of this jungle, infested with Japs, can be as hopeless for lost flyers as the bottomless gaps between the Himalayan peaks; Sevareid lived to write his story for *Reader's Digest* because his party came into the hands of natives willing to give them up to the British.

Crews flying the Hump usually wear a small flag sewn on the back of their blouses, either American or Chinese. If they crash in potentially friendly territory, the flag helps identify them; they also carry identification cards in four languages. Beneath the flag is a silk map of Burma and China, which they may want in time of emergency.

It is no secret that many planes flying the Hump have been lost without trace. Pilots have reported down-drafts that threw a plane 2,000 feet and almost wrenched off its wings. The 250-mile flight may take one hour, or several hours, or forever — depending on the winds and a pilot's luck. There is often no visibility; practically all the course must be done by instrument. Flyers may leave India in noonday heat of 125 degrees, sweltering in the lowlands where 200 inches of rain fall a year; they must swiftly climb to sub-freezing heights of as much as five miles, to clear the jagged wall. A good part of the route is subject to Jap attack, and Jap patrol planes operate dangerously close to some of its segments.

One measure of the hazards of the work is the award of decorations.

Of the 1,200 decorations awarded thus far in the war to the Air Transport Command, more than three-fourths, or over 900, have been conferred on personnel of the Indo-China wing. This is the mission that today is being regularly flown by Liberator pilots, in an operation that for over a year has been veiled in military secrecy, and was first mentioned to the public at the beginning of 1944. Opening of the air route, in 1942, was necessary because of Japan's attempted isolation of China.

China, in the words of General Arnold, is our most effective base for aerial operations against Japan. But with China walled in on one side by geography, and on the other by the ring Japan has drawn around her, logistics is our torturing problem.

Our 14th Air Force in China, under Major General Claire L. Chennault, is using its fighter squadrons for aerial guerrilla warfare. We also have heavy bombardment groups in China, using Liberator bombers.

Every item of supply used by these forces is being flown to them across the Himalayas. Liberator transports have been assigned to the work. The size of the problem can be measured in terms of gasoline. On a round trip over the Himalayas between Assam and Kunming, the Liberator express plane can deliver 4 tons of gasoline to our forces in China. To do so, it must consume 3½ tons of gasoline for its own power.

Four such round-trip flights over the terrifying peaks must be effected before a Liberator crew can take off in China for a long-range mission.

To help with this logistics problem, the Liberator crews in China are going back and forth to India, between their bombing missions, to bring in their own gas and bombs to their China base. Such work involves a continuously exalted heroism of the men which an observer can only tell of in humility, without comment.

Present operations were begun in the critical days of 1942, when the Japs were pushing down toward Singapore, the tragedy of Bataan was just ahead, and the loss of the Burma road by Japanese occupation of Burma was imminent. In the emergency, the President ordered the creation of a Ferrying Squadron of the Tenth Air Force,

Lieutenant Kass shows a Liberator pilot and co-pilot dodging from the fire of a Jap Zero that has flown at them head-on; note penetrated windshield.

stationed in India; the most experienced pilots in the service were assigned to it; and the first trip across the Hump was made in April, 1942. More than a fourth of the planes used were wrecked, shot down, or destroyed in the first eight months.

Today, through monsoon rains and tornadoes of wind, sleet and snow, the flights go forward on calculated schedule. Until such time as we can either capture from the Japs a seaport on the coast of China, or we conquer Burma to permit opening another overland route to our Chinese bases, this route is all we shall have.

Although the flight into China from Assam is the most extraordinary part of the undertaking, the flow of supplies starts not in Assam but from bases far back in India. Creating and maintaining these bases is itself a remarkable achievement.

When Major General Lewis H. Brereton and his men first arrived in India, they found only ten airdromes in the entire country. British defense had been based on the theory that the only possible threat could come from the northwest, through the Kyber Pass. The attack from the East, when the Japs seized Burma, called for radically different strategy. To effect it under the enervating heat, the apathy of the natives, and what General Arnold has called the total absence of modern methods and equipment, was a staggering prospect. Assam, for instance, is separated from the rest of India by the Brahmaputra, which is crossed by not a single bridge.

This ferocious Liberator shows the Tiger Shark design used by airmen in India to awe the Japs.
ASC Photo

The men who have been pioneering the job are among the really great heroes of the war. Little has been heard from them, for news flows to the press services much more readily from the European theatre than from India and China. Nor do the bomber crews and fighter pilots of the 10th and 14th Air Forces stand alone in their daring. The pilots and crews of the Air Service Command, headed in India by Brigadier General Robert C. Oliver, are taking equally brave risks.

When Captain Eddie Rickenbacker went through India to Chungking, he told Sonia Tomara there that, after New Guinea and the Solomon and Aleutian Islands, the India front outstrips all in its hardships for our men.

"It's such a big front to fight on," he said, "and the ground's so difficult. Worst of all, you are at the end of the supply pipeline. In the first war, we had Paris to go back to. When on furlough, we could forget the battlefields, and let steam off. The boys here have no place to relax."

Worse, men whose fighting activity is curtailed by the lack of supplies must endure long hours and days of killing ennui. It is hopelessly weary to sit by a plane from 4 a.m. to 7 p.m. waiting for something to happen. Captain Eddie tried to cheer them by telling of the dreadful conditions under which American pilots were fighting in the Pacific.

THE CORONADO TRANSPORT
The 4-engined Coronado flying boat, used for bombing Jap island bases, also has a transport version, pictured here at anchor in a harbor in Brazil.

Air Giants

By Lt. Charles O. Mohan, USNR

JUST a few days after Pearl Harbor, the Naval Air Transport Service was established by the Secretary of the Navy, and Commander C. H. "Dutch" Schildhauer, formerly with Pan American and Glenn L. Martin, was appointed to organize and operate the new NATS. Since promoted to the rank of Captain, he chose the Coronado for the long-range workhorse of his flying transport service.

The possibility, in operating long-range flights between continents, of landings at sea, and the lack of adequate landing fields on intermediate islands, made the flying boat seem most logical for a transport, even though its speed was less than that of land based planes.

The Coronado, called by the Navy the PB2Y, was originally designed as a four-engine patrol bomber. Capable of operating at a gross weight of 68,000 pounds, it could carry a useful load of 26,725 pounds over 2400 miles with ease.

After careful study by Captain Schildhauer and his assistants, the PB2Y was stripped for conversion from patrol bomber to transport. This stripping raised the payload for a 2400 mile hop from 4855 pounds to over three tons, and flights were gotten underway almost immediately.

Emergency war demands of the Navy Fleet in action have called on the Navy's "Flying Barge" for many a feat that would never have been dreamed of in peace-time. It has transferred whole companies of ma rines from base to island, and maintain the logistic support of these men from th day forward.

It transports huge quantities of ma greatest of all morale builders, to the tho sands of troops stationed overseas; resc crews of sunken ships found floating in t waters of the ocean; supplies fighter squ rons at southern bases.

It has been rumored, though never co firmed, that the bombing attack on Tok led by General Jimmy Doolittle, was ma possible only by a supply of droppable fu tanks furnished his squadron by the Na and flown to the area by NATS in Co nado "barges."

Dmitri Kodachrome

Shown above are Navy Liberators at a South American base, part of the great fleet of heavy land-based bombers that the Navy has used for scouring submarines from the Atlantic, is now sending against the Japs' island strongholds.

...in the Navy

THE LIBERATOR THAT FIGHTS SUBS

The Navy's sea-going Liberator has helped conquer Hitler's submarines, is playing a big role in the Pacific.

By Howard Stephenson

COMPARED with the Army's Liberator, colored olive drab like the Army uniform, the snow white Liberator that flies the oceans for the Navy looks almost jaunty.

When you clamber up through the white belly, and take station as observer just behind the cockpit, you are in the midst of a crew in navy uniforms, speaking seamen's language.

Left is port and right is starboard, and the tail gunner sits aft and the pilot is at the helm. When your ship takes off she sails. When she loses altitude she sinks. When she lands she has made port and her crew has been beached.

The PB4Y, as the Navy calls her, is essentially the same as the Army's B-24 with a few modifications. She is not a flying boat like the famous Cat or Coronado — she has no pontoons, and is based on land. But she's a ship, regardless, in her function — which in the Atlantic theatre is ocean patrol for spotting and destroying submarines. She sails, if you like, in her own ocean of air, limited by no coastline.

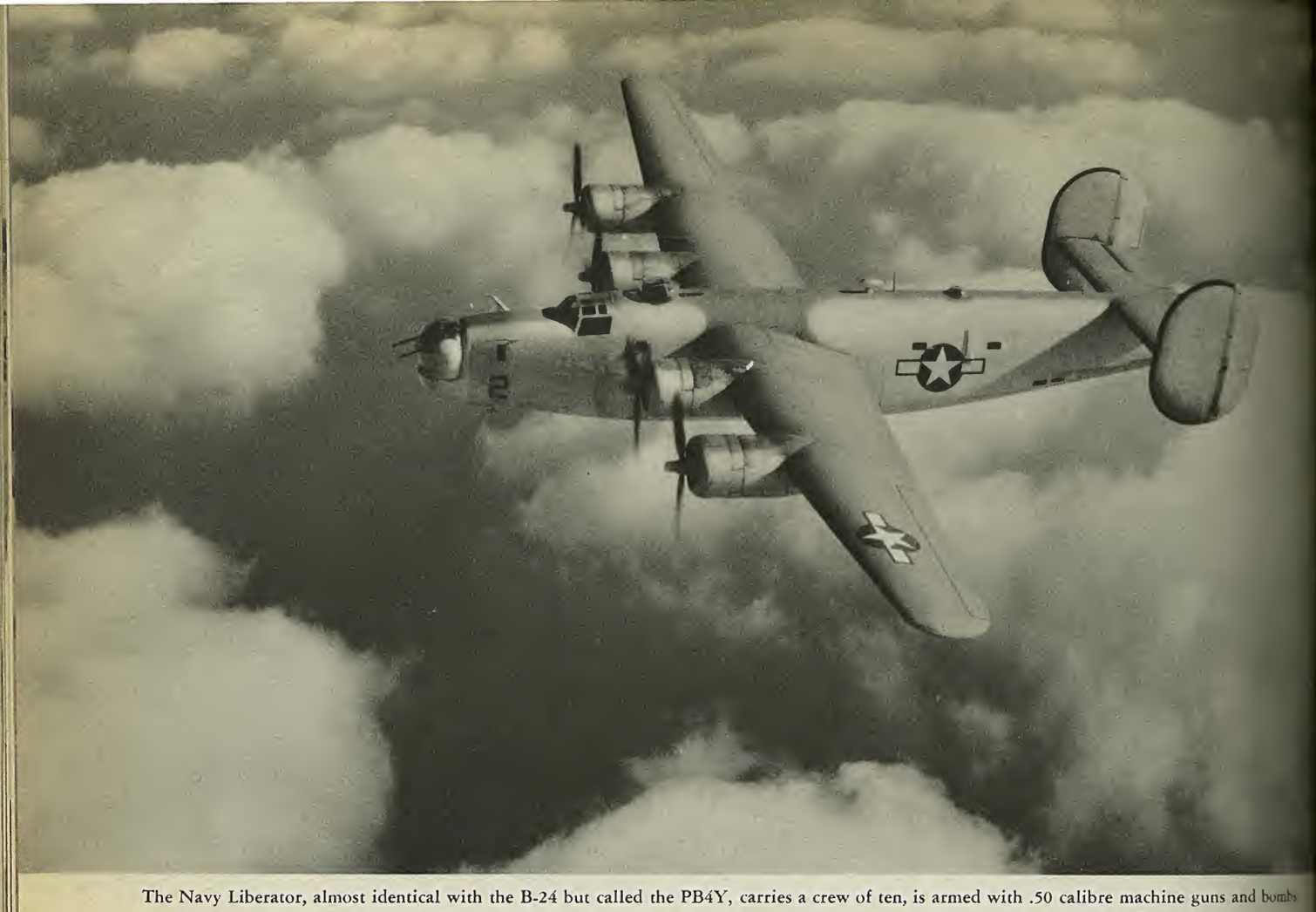
The Navy's Liberator crews are given special training for their job, and their assignment is regarded as an honor. The Liberator is the Navy's largest bomber.

In your seat as an observer you watch the crew preparing for the "sailing."

Up forward, the nose gunner pokes forth a .50 calibre machine gun. The nose turret he rides in resembles a giant ball-and-socket joint. It swings to permit him to swivel into any angle — up, down or sidewise.

The pilot checks the tachometer on the broad instrument panel before him. This indicates the speeds of the four engines, now purring synchronously.

The propellers are on a line with the



The Navy Liberator, almost identical with the B-24 but called the PB4Y, carries a crew of ten, is armed with .50 calibre machine guns and bombs

pilot's head. Both pilot and co-pilot have developed such perception of eyes and ears that they can instantly detect any slightest loss of unison in propeller motion. The instrument board will also tell them. But their sharpened animal senses will often speak as truly.

Now brakes ease off, and the pilot's right hand is slowly pressing back four small levers.

The runway is flowing toward you, is swallowed fast. You gain speed. The enormous tricycle on which the Navy Liberator is mounted balances its 28-ton burden perfectly. The pilot's knuckles are white as he grips the wheel.

"Hydraulic pumps open," the engineer reports. "Booster tanks open. Engines on. Stand-by generators on."

Alert, you await the moment of actual rising into the air. Though you have flown a hundred times, this can never be a casual thing to you.

You are off the ground before you realize it. The end of the runway is no longer in sight. You peer down on green foliage and a sand strip which marks the coast like a bright yellow crayon. Now this color is gone and the white crests of shoreline breakers also fall behind. The plane is rising steadily.

There is a decisive click back in the belly.

"Landing gear retracted," reports the engineer. The instrument board has already given the pilot this message. Navy crews take double precautions as routine.

Out under the left wing a small metal lug protrudes, painted red so that it may be seen the plainer. Until the gear is locked in place, this red lug is not visible. On every takeoff it must be seen and reported promptly. Before every landing, a similar visual check on the locking of the landing gear in position must be made. This tiniest of safety details impresses you.

At 700 feet, booster pumps are turned off. The real climb starts, and you are rising 1000 feet a minute, with the engines doing 2550 rpm.

"How high now?" you ask.

"Just 5000," the co-pilot says.

"How far can we see?"

"Eighty-two miles, at this height. If you stood on a raft at the surface, you would have a visibility range of two and a half miles. On a destroyer deck the radius would be a little over six miles."

A CIRCLE of 82 miles radius takes in a [illegible] of ocean. But these Liberators of the Very Long Range anti-submarine patrol, sweeping out in great arcs from both sides of the Atlantic, have to scan an area twice as big as North and South America. You stare out awhile at immensities – the flat blue saucer beneath, the inverted blue bowl overhead.

Space in such dimensions isn't easily grasped. You turn to the pilot.

"Why is the PB4Y doing the Very Long Range patrol job, instead of some other plane?"

"She's so doggone maneuverable," answers the pilot, a lanky Texan who spent two years in the RAF before he joined the Navy. "You take her awhile," he tells the co-pilot, "I want to explain.

"She has speed," he continues. "No flying boat can touch it. To blast a sub takes only 30 seconds, but the last 10 seconds could be fatal if you couldn't depend on your ship. The subs have improved their fire wonderfully. You've got to travel.

"Then she'll go up when you have to — over 25,000 feet, it says in the book. She'll better that.

"Obviously, the range counts. She'll

ster and farther with a heavier bomb load than anything else in the air."

From his post aft of the bomb bay, the bombardier-navigator talks via interphone to the co-pilot; and we change direction.

"I'll take her now," the pilot says, "and I'll show you what maneuverable means."

One of the small levers which govern the engine is slowly pushed up.

"Watch the far prop on the port side."

The propeller, which an instant ago shone in the Southern sun like a solid disk, slows down to become a whirling pinwheel, then stops dead. Its blades now stand out stark and motionless. One engine is out, a mile and a half above open sea. The ship holds steadily to her course, overcoming the torque without a tremble or a lurch, as the remaining three engines drone on.

The co-pilot's grin is like that of a coach watching his team plunge down the field.

"Take off the other one," he suggests.

"Yep," says the pilot.

This time you gulp. Maybe you are a little white around the gills.

The second prop on the same side drops to a visible spin, then stands stockstill. But the Liberator still wheels steadily on her course, making 150 knots, drifting down at a rate of only 300 feet a minute — on two engines.

"That's how she'd maneuver if two engines on the same side were shot away," the pilot says, as he resumes normal operation and carefully synchronizes the speeds of the four engines. "Under battle conditions, when you pitch everything overboard that can be spared, she would actually rise.

"She's like a good horse, in a way," he remarks a moment later. "Responds, you know. Don't have to saw the bit or dig in her sides with your spurs. Just coax a little and give her the rein and she'll bring you home." He pats the steering wheel as if it were a Texas pinto's nose.

Unless you were to see a sub, the rest of the trip is routine. If you did chance to see one, it could not be told.

You skim over miles and miles of water, and at the signal from the navigator-bombardier start skimming on the homeward arc. Pilots and crews of the anti-sub patrol think they have the dullest of assignments. They compare it to running an elevator or driving a trolley car.

Except — for the 30-second payoff, the time it takes to blast a sub.

Back at the land base, you examine some symbols painted on the sides of PB4Ys.

"Looks like a pretty good score," you comment, trying to assume the air of casualness which comes so naturally to these young Navy fliers. A veteran pilot of 22 shakes his head ruefully.

"Trouble is," he answers, "we've got to go so long, nowadays, without finding any target."

What he means is that most of the subs that once made good targets for our anti-sub patrol are now rotting at the bottom of the sea.

Admiral Peary — Navy's Prophet of Airpower

By Marie Peary Stafford

FEW know that Admiral Robert Edwin Peary, discoverer of the North Pole, holds rank with the Army's Billy Mitchell as a great prophet of the air age we now are living.

In 1914 he told the Aero Club of America:

"Airplanes will not only cross the Atlantic and fly around the world, but cruise to the North Pole across the polar basin within a very short time. The inner polar regions will quickly yield their last secrets."

It was then, at the beginning of the First World War just thirty years ago, that he proposed a plan for our aerial coastal patrol strikingly similar to the one we are using now. Said Peary:

"No nation can win respect or exert influence unless it stands for forcefulness and strength.

"In no way can we, as a nation, stand so effectively for forcefulness, for strength and for world influence as by Command of the Air. Twenty four hundred years ago Themistocles, Athenian statesman, soldier and creator of Athenian naval policy, asserted the principle that 'He who commands the sea, commands all.' This principle still holds good. But today it has a rival, the command of the air, without which it is beginning to be valueless. And in the near future it will be superseded entirely by the axiom 'He who commands the air, commands all.'

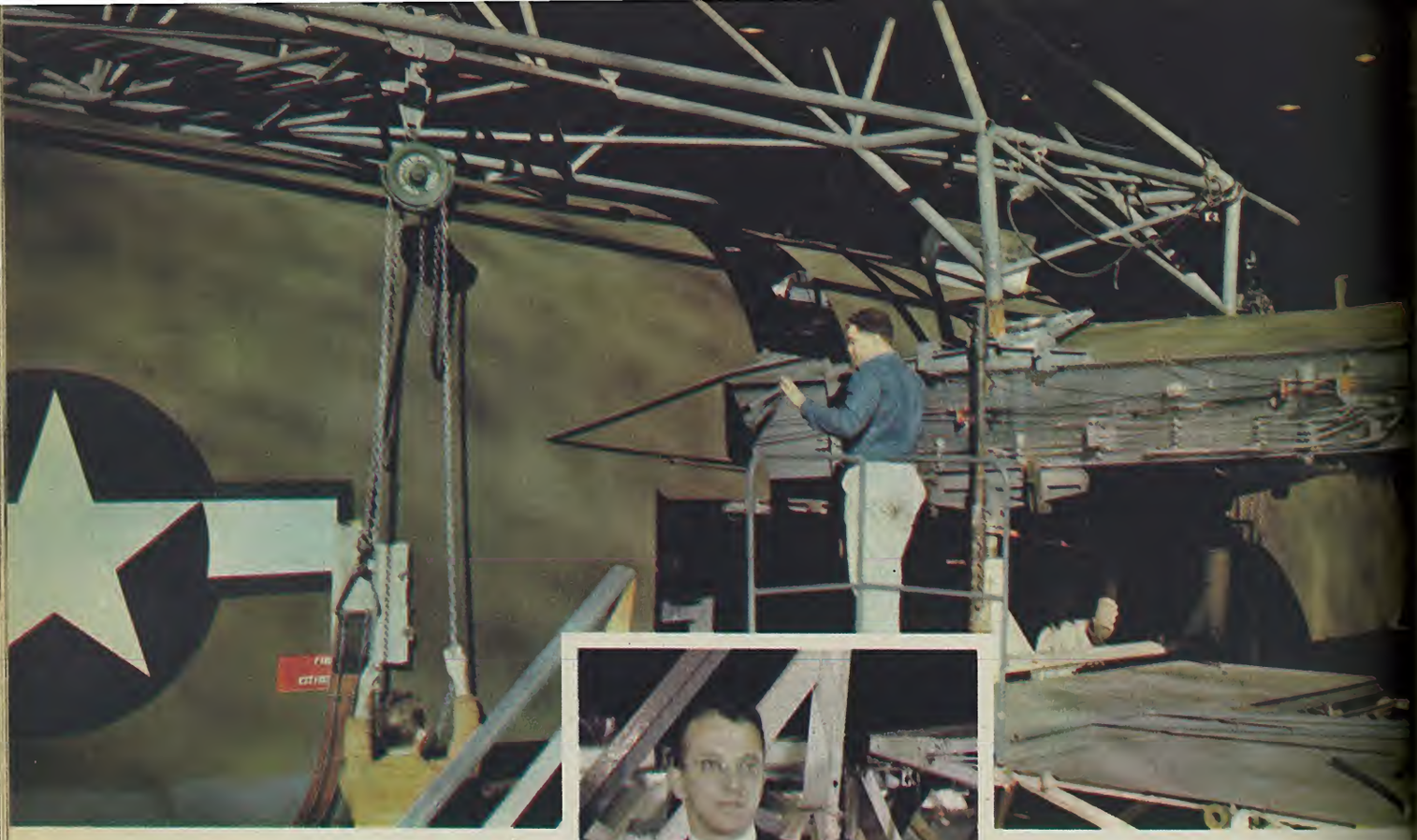
"The plan to establish an aerial coast patrol, consisting of a chain of aviation stations, one at every fifty or one hundred miles along our coast, is developing fast. The inexorable logic of actual events is working powerfully for it.

"The Aerial Coast Patrol is to provide a continuous picket line of seaplanes or flying boats fifty miles or more off shore around our entire coasts — from Eastport, Maine to Brownsville, Texas, and from San Diego, California to Cape Flattery, Washington — each machine travelling back and forth over its section or 'beat', a winged sentinel forming a cordon and weaving a blanket of protection around the country.

"By means of the wireless, information as to the character, number and apparent destination of approaching ships will be transmitted to the shore stations and from there to Washington. If the ships are hostile, orders will issue directing the movements of our fleet and the submarine squadrons; for the preparation of the coast defences; and for the concentration of troops, if necessary. Reserve planes hurrying out will keep the approaching craft under continuous observation.

"Such a system is a departure. The like of it exists nowhere at present. And yet it involves no new principle, but is simply the utilization and multiplication of the known capabilities of a single seaplane.

"Seaplanes and small dirigibles on the order of the English 'Blimp' constitute an air power which can combat the submarine menace better than any other agency worked out at present. Aircraft are more effective in detecting and destroying submarines than are submarine chasers or armed destroyers. Under favorable conditions of wind and weather the submarine is helpless with an aircraft, armed with bombs, hovering above it."



PRODUCTION MAN

Charles W. Perelle, above, Vice President of Manufacturing, captains the production team for Consolidated Vultee. He was born in Juneau, Alaska, January 5, 1903. After University graduation he started his aircraft career at the bottom by entering the Boeing plant at Seattle in 1930 as a paint shop helper. He was promoted rapidly, moved on to Vultee in 1940, and soon gained widespread prestige because of the part he played in stepping up production sensationally. After the merging of Consolidated and Vultee, resulting in the formation of the world's largest airplane producer, Perelle was appointed Vice President of Manufacturing and placed in charge of production activities at all eleven manufacturing and modification divisions. He was elected a director of Consolidated Vultee Aircraft Corporation in October, 1943.

REACHING PRO

VISUALIZE if you can a gigantic jig saw puzzle of over 100,000 pieces, a puzzle that must be completed on a certain hour of a certain day. The parts for this puzzle are scattered through most of the 48 states of the Union. Your puzzle, when it is done, will weigh more than 27 tons and will fly through the air at over 300 miles per hour. It will be a Consolidated Vultee Liberator B-24.

When a new B-24 rolls off the assembly line at 1:30 p.m. tomorrow it will be a completely calculated event. That Liberator, and every other one that precedes or will follow it, is the result of planning that extends back over many months, reaching out from San Diego to every plant in the country where raw materials or parts for the Liberator are made, and to every rail and truck line that handles these parts on their way to their scheduled meeting on the San Diego assembly line.

Such planning, centering in the corporation's nerve-center at San Diego, multiplied for each of its eight manufacturing divisions and three modification plants, was the critical factor that enabled the company in 1943 to produce more airplanes by number and weight than any other aircraft manufacturer in the world. During that year more than 126,000,000 pounds of airplanes were delivered by the company to the armed forces.

The production team that has made this record possible, by integrating the work of more than 100,000 men, is captained by C. W. Perelle, Vice President in charge of manufacturing. A brisk man of direct action, he sums up his theory of successful production this way:

"The keynote of production is movement, scheduled and coordinated. Volume production requires the complete and coordinated use of men, materials and machines."

Setting up volume production in the aircraft industry was no small task. Before the war, production of airplanes was largely on a unit basis. Hand-built individual airplanes were tailored to meet the requirements of various customers. Orders for 50 airplanes were considered large. Expensive tooling was unknown. Consolidated Vultee, pioneering the use of moving assembly lines for airplanes, today has practically every part on every Liberator so standardized that it can be interchanged for a similar part on any other.

The production team at San Diego, setting the same general pattern for all the Convair plants, is made up of five main groups: Material Procurement, Sub-con-

NG PRODUCTION GOALS

ing, Tooling, Production Control, and nufacturing. The successful solution of three-dimensional jig saw puzzle, to ch a Liberator was compared earlier, on their shoulders. Only through the dinated function of these groups is it ible for planes to roll off the assembly s on schedule.

To achieve volume production the ups under Perelle's direction work ily in this way:

After a new model has been decided on, experimental engineers have made the gn drawings and built by hand a flying del or prototype, production engineers aw the design for production in quan-. Then the Tooling Group receives the prints of the new ship. There will be s of these blue prints — often as much as freight car load.

Tool and Assembly Planning now study se drawings to decide on the most effi-nt method for building every individual t. For each part they prepare an opera-n sheet. This operation sheet outlines e fabrication and assembly processes that part must go through. A copy of it ac-mpanies the part on its entire journey rough the plant.

Individual parts, as they are completed, e joined together to form sub-assemblies, d sub-assemblies are in turn fitted to-gether to become assemblies. Assemblies ch as rudders, stabilizers, and elevators r the tail assembly are united to become ajor assemblies. And finally the major ssemblies — wings, fuselage, and empen-age — join on the final line to become a mplete airplane.

In addition to planning these steps in e evolution of a plane, the tooling organ-ation also designs and builds special tools, ch as jigs and fixtures, and thousands of rm, pierce, and blank dies.

LAYOUTS for equipment and departments must be simultaneously developed.

A large aircraft plant may be visualized a river with numerous tributaries. reams of metal parts flow from tribu-ries into the main channel until they converge on the final assembly line and emerge as a complete airplane. The fundamental rule is to keep these lines as short and straight as possible. Costs increase every time material is handled or moved. Layout engineers plan to have material arrive at one end of a plant, and move in one general direction to completion.

It often is expedient to procure some parts or assemblies from sub-contractors, instead of making them in the home plant. These items are referred to the sub-contracting department. For one large division, over 100 sub-contractors deliver parts and assemblies. In effect, the floor area and manpower of these 100 sub-contracting plants is added to the facilities of the main plant.

To feed the production machine, raw materials and labor must also be obtained. In the San Diego division, material and parts are ordered from approximately 2,200 vendors all over the nation.

Labor is "requisitioned" from the employment department. There must be mechanics, welders, riveters, machine operators, electricians, upholstery workers, armament workers, and a host of other skills necessary to build an intricate airplane.

After these preliminaries — still before the parts can be manufactured — the extremely important Production Control department enters the picture. The keynote of production is movement, but it must be controlled and scheduled almost to the minute.

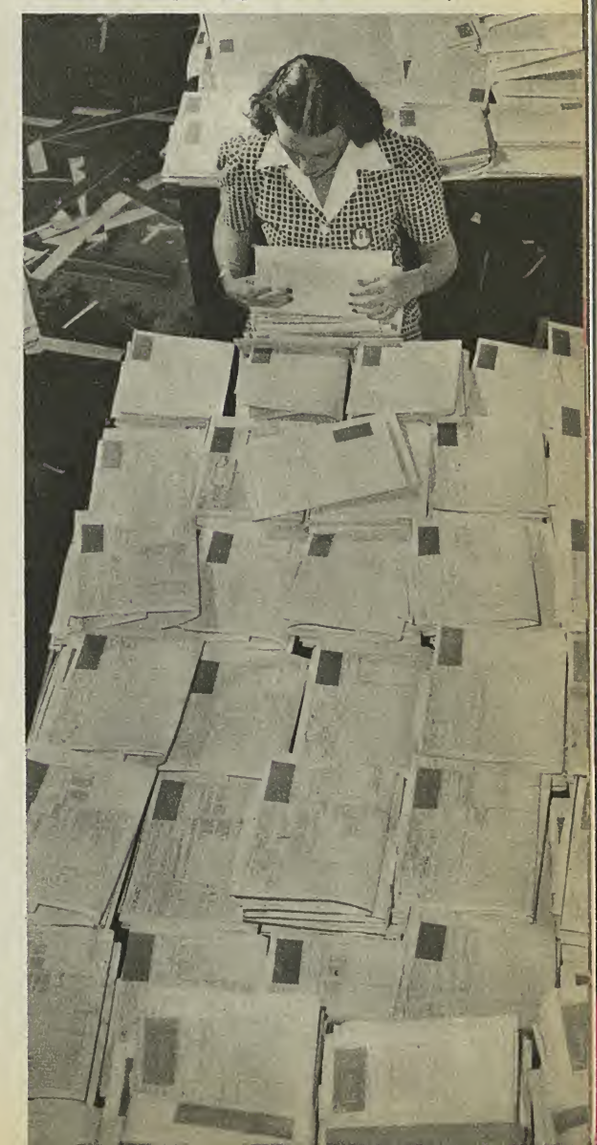
A system of traffic control is used to coordinate the flow of material, parts and assemblies. Otherwise there would be chaos. Delivery schedules for completed airplanes are prepared for months in advance. Thus the production department always has a well defined goal. Plans for production are always based on the number of planes to be delivered on given delivery dates. Orders for millions of parts stream into the manufacturing departments, for delivery accordingly.

The Production Control department is therefore somewhat like a railroad dispatching system. It keeps intraplant production movements on a schedule. Material, parts or assemblies must arrive at a work station at the specified time, and in sufficient quantities. Each component of a completed airplane must leave the end of the assembly line at a predetermined day, hour and minute. Everything within the extensive organization is geared to that performance. The wrath of the gods descends upon any individual or department which fails to meet it.

As an illustration of the scheduling system, take the long wing center section for the Liberator bomber. These sections are started in vertical "bucks." The main beam of the wing structure, called the front spar, is laid down first, like the keel of a ship. The actual schedule for assembling the wing of ship number 9747 was as follows:

The front spar was scheduled to be in position by 7:49 a.m. on Wednesday, January 5, 1944. Work on the wing in this vertical position is divided into 34 operations, each of which had a scheduled com-

Acres of blueprints, processed mechanically.



pletion time. For instance, at 11:32 a.m. on the same day, the fourth operation called for completion of drilling on spars and bulkheads. By 5:57 p.m., the lower surface skin was scheduled to be installed. The 22nd operation called for placing the upper surface skins by 7:36 a.m. next day. It was due to be hoisted out by the overhead crane for transfer to the horizontal position line by 11:12 a.m.

Schedule boards in each assembly department show visually the status of every assembly order.

Reference to the schedule shows that foremen and inspectors had stamped it after each operation, indicating that the work had been performed and inspected on time. No. 9747 was due to leave the horizontal line at 6:02 p.m. It departed promptly to keep an appointment with the two sections of the fuselage about a mile away at 6:30 p.m., for mating. It was there on the dot. Ship No. 9747 then moved down the final assembly line, arriving at each of the 54 stations as punctually as a streamliner running on schedule. The time table for No. 9747 and its component parts was prepared weeks in advance. It predicted that the completed ship would leave the final assembly line at 1:30 p.m. on January 18. It did.

As long as the schedules are religiously observed, everything progresses smoothly. If any one department, from detail manufacturing groups to the sub-assembly, major assembly and final lines, gets out of step, it affects the entire process. Costly adjustments must be made, man hours pile up, lines slow down, and the entire production machine resembles a car engine badly out of timing.

The working efficiency of production control directly affects the rate of production. Its traffic officers, called dispatchers, are on duty to prod fabrication of vitally needed parts which may have fallen behind schedule. Each large building has a ... patching organization headed by a ... man. Dispatchers patrol the various ... partments and, in effect, operate traffic ... nals at strategic points.

Control over materials must extend ... yond the plant. Daily, the production ... department receives reports indicating ... status of shipments en route from factories, mills and sub-contractors. The traffic ... partment keeps in touch with each ... ment in order to keep the inflow ... material under control. If a railroad ... containing vitally needed assemblies ... by a sub-contractor is behind schedule, ... in Omaha, it will be intercepted and ... by express to assure arrival on time.

Although the full coordination of ... machines and materials is the main ... mula for production, there are several ... alytic agents used to accelerate the pro...

For instance, thousands of ideas are ... mitted by employees, under the comp... plan for rewarding suggestions that will ... prove production. In the San Diego div... last year these ideas saved over two ... million man hours. There are the ... improved methods and procedures ... developed by the Industrial Engineering ... and Manufacturing Research departments. There are the training courses given ... many thousands of employees to develop ... greater skills and ability.

Direction of such a complex organiza... tion of men, machines and materials ... combined in Consolidated Vultee's ... facturing and modification plants demands ... managerial ability of the highest type. ... human element remains the heart of ... duction triumphs. Capable supervision ... coordinate the efforts of the men ... women in the fabrication shops and on ... assembly lines is as indispensable in ... building of airplanes as in the conduct ... a military campaign.

Production victories are won through ... careful staff planning, backed by the ... and determination in the execution of ... plans of every person assigned to the ... dertaking, from top ranking officers to ... soldiers of the assembly lines. Out of ... exact control of men, machines and ma... rials exercised by Perelle and his staff ... that precise timing of manufacturing ... ations which is essential to efficient ... production of aircraft.

Making Tomorrow's Air Men

THE CAP STARTS THEM YOUNG

With cooperation of educators, members of Civil Air Patrol throughout the country are acting as "big brothers" to young people of 15 to 18 who want to become flyers someday. CAP Cadets are given ground instruction in a wide variety of practical aviation and military subjects, and many are given opportunities to fly with their CAP friends.

When a lad reaches 17, he may apply with his parents' consent for the Air Corps Enlisted Reserve, where he receives the AC silver wings and still trains as a CAP Cadet in the courses which will help him most in the Army. On call to active duty at 18, he will be given a chance to qualify for Aviation Cadet training, a $30,000 education. Girls also are preparing in the CAP Cadets for service as Air WACs.

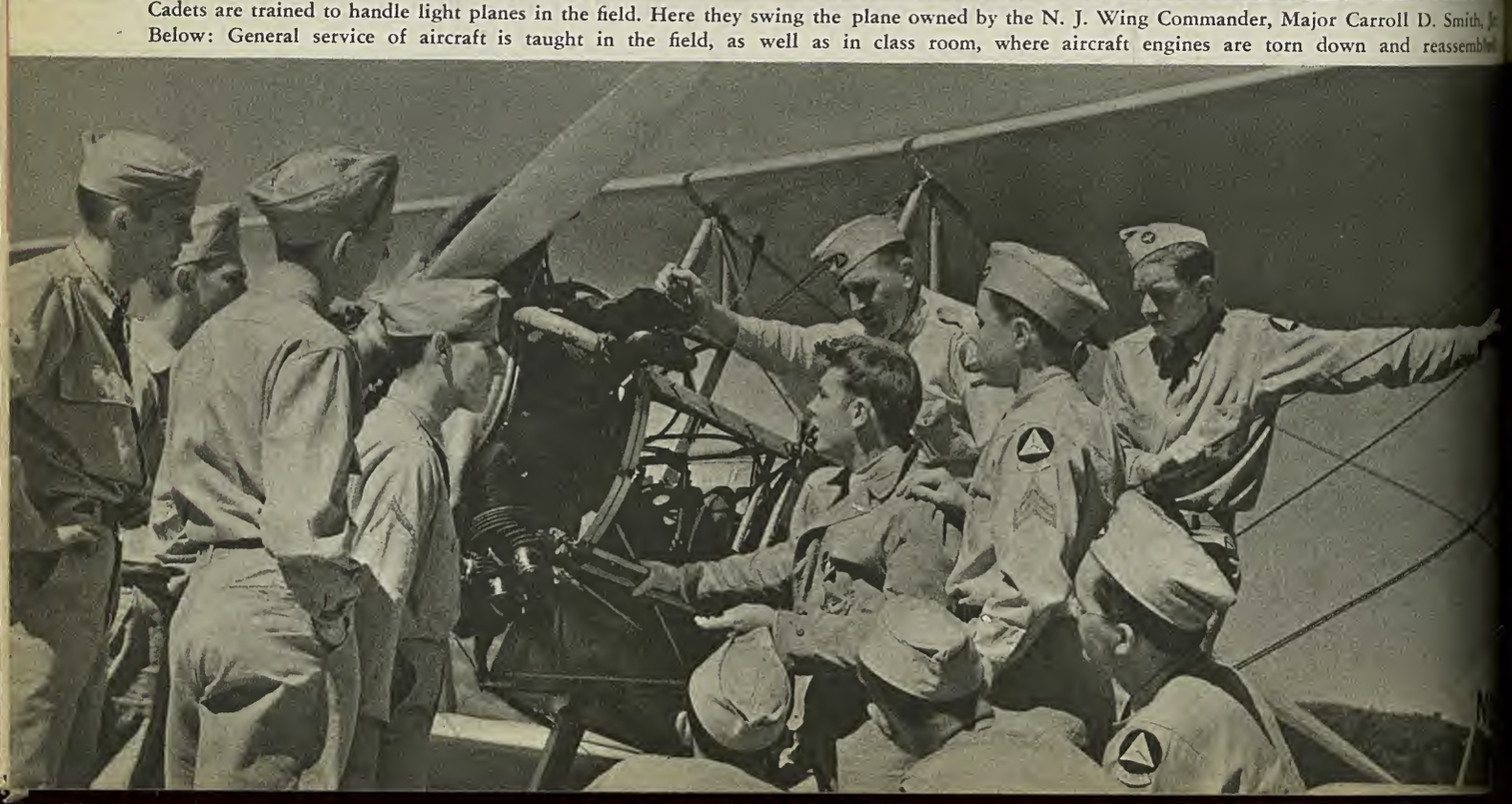
CAP members, usually leading citizens in their communities, are ideally suited for the responsibility of recruiting boys for the Air Corps. The pictures of CAP Cadets on these pages were taken through the courtesy of the New Jersey Wing.

Black Star Photos by Pat Liveright, New Jersey Wing 22, CAP Squadron 222-1

CAP Cadets get minimum of 20 hours of instruction in communications. Many CAP cadets are licensed radio operators.

Cadets at the pistol bench, receiving instruction in target practice. The instruc
is a former United States Army officer, who now is engaged in local police w

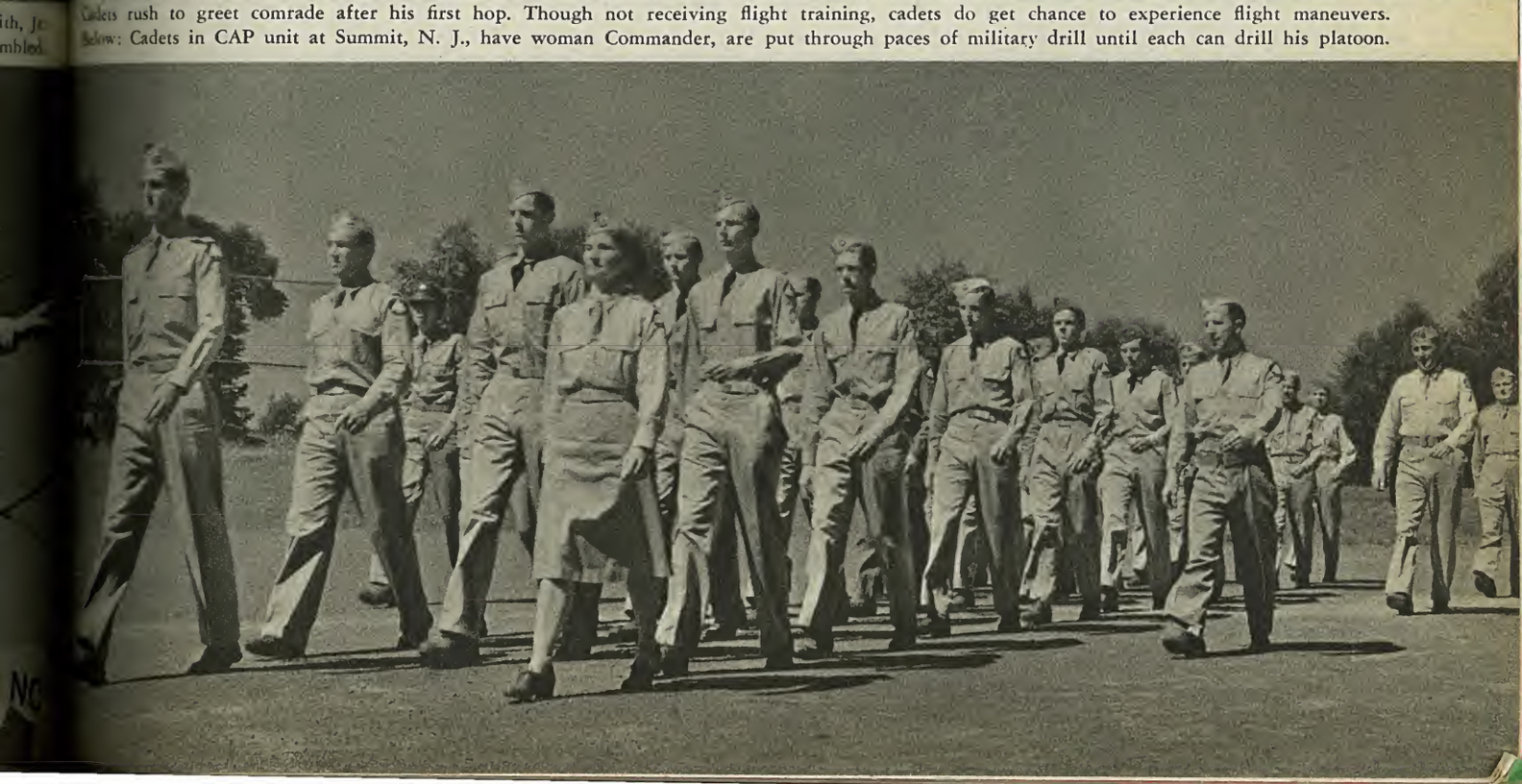
Cadets are trained to handle light planes in the field. Here they swing the plane owned by the N. J. Wing Commander, Major Carroll D. Smith, Jr.
Below: General service of aircraft is taught in the field, as well as in class room, where aircraft engines are torn down and reassembled



Cadet in the ACER, nearing the end of his CAP training and soon ready for the Army Air Forces, tells potential cadets about the thrills of flying aloft they will experience.

The CAP has many women members. Here Jeanette S. Smith, a Squadron Commander, gives radio instruction in an airplane.

Cadets rush to greet comrade after his first hop. Though not receiving flight training, cadets do get chance to experience flight maneuvers. Below: Cadets in CAP unit at Summit, N. J., have woman Commander, are put through paces of military drill until each can drill his platoon.



American ferry pilots and crew members on field in New Caledonia, with Liberator transport in background, awaiting flight back to the United Sta

Trans-Pacific For ATC

Here is the biography of a Pacific airline that relatively few people have yet heard about, though it is doing one of the vital jobs of the war. The story of how it got started and what it is accomplishing is a case history in American ingenuity under war time pressure.

TODAY the United States has some fourteen companies flying regular international schedules under the direction of the Air Transport Command. When the war broke, our military problem was to establish air routes around the world with overnight dispatch, regardless of red tape or formality. Where existing organizations could do a job they were told to pitch in. Where none existed, the ATC created new facilities. These are now all interwoven in a magnificent trans-global air service.

The work of flying the Pacific now being done by the Consairway Division of Consolidated Vultee is an example of the way American industry has put its shoulders to the job. Consairway has emerged from a small beginning into an important function that for two years has come under the classification of "restricted" information. Only in 1944 has some of the restriction been lifted, so that the operations of the line can be explicitly described.

Toward the end of 1941, a serious problem arose in the transportation of crack pilots across the Pacific.

Consolidated was delivering its planes under their own power to far-away Pacific points, and had 14 complete crews engaged in the work. The delivery was a swift and simple matter. But getting the crews back again took from 20 to 30 days by boat.

Stepping up deliveries could obviously be best achieved by stepping up the speed of the return trips. That was why, in April of 1942, General George authorized the Corporation to put two planes into service over the route between Australia and San Diego. Those two planes were the beginning of the service that soon outgrew its first limited purpose entirely.

The planes were early model Liberators, converted for passenger carrying. The first one out made the round trip in 9 days, bringing back from Australia 22 personnel of the AAF Ferry Command.

In those days our Pacific bases were still hardly born, and many rough conditions still had to be overcome. Communications were deficient; fuel supply could be uncertain; facilities for servicing aircraft were at a minimum; even food and quarters for crews could be a problem. But the service kept going, and in its second month had four more planes added to its schedules. It was then called the Consairway Division of the Corporation's Flight and Service Department. Later it became a separate Division of the Corporation.

Almost immediately the needs for [air] transport in the South Pacific began [to] ing the capacities of the small line [Co] of the many important projects it [ac]plished in the early war days was [the] of moving 500 men to Australia – [pi]and ground personnel of a pursuit [gro]Critical repair parts for combat [air]were flown across. One trip carried [the] 2000-pound torpedoes, complete with [war]heads. Another transported twenty-[five] 240-pound bombs in crates. Ferry [crews] mail and other high priority cargo [was] carried on all return trips.

INCREASED operations soon demand[ed] that a separate maintenance depart[ment] be organized for Consairway. Equip[ment] was procured, and maintenance time [was] lowered. Quarters, food, and general [op]erations constantly improved. Weather forecasting and communications were

ped; radio aids to navigation were in-lled at stations. Frequency of schedules s gradually advanced. In August, 1942, nsairway began supplying reciprocal rvices, sharing its maintenance equip-nt and personnel with United Air Lines. was agreed that Consairway should carry ited Air Lines Captains as crew members familiarize them with the Pacific route, ding their later assignment of work for ited.

Late in 1942 Consairway proposed to the Service Command that a service base built at its Australian terminal. ASC ved. A maintenance base capable of dling several transport planes each day projected. Personnel went to Australia m San Diego to take over the mainte-ce work before facilities were complete.

Today Consairway in Australia is oper-ng on a three-shift basis. It services at st two of its aircraft each day. And to-y's average plane layover time is eight urs, as against twenty-four hours before mpletion of the project.

Three additional B-24 aircraft were gned Consairway by the Air Transport mmand in August of 1942. One was con-ted for immediate use, and schedules e to alternate day take-offs as it became e sixth operating plane. The other two 24's were converted for utility in carry-g both passengers and freight.

All Consairway co-pilots are given a course in the Division's navigation school. When the co-pilot is considered ready for check out, he is reassigned to the company's Flight Department. Here he is given opportunity to perform for check pilots on shakedown and delivery flights.

After passing a rigorous course of checking on both four-engine technique and instrument flying, the pilot is checked out as a

R. S. Mitchell, Manager of Consairway.

Flight Captain on local flying, and again on dispersals. When he has performed as Flight Captain on this job for 200 hours, the pilot is reassigned to Consairway, and is given a refresher course in navigation. Then he is sent for two familiarization trips over the trans-Pacific route as a co-pilot.

Because of his progressive development in this step-by-step manner, the pilot finds the aircraft mechanism no problem, and his entire attention can be devoted to navigation, weather, and other problems of long-range flights.

Some Consairway Captains have also been trained by operating as Flight Captains on Catalina PBY aircraft, when these are ferried over the Pacific for various Navy projects. If a Captain's total flight time is considered to be inadequate, he is assigned to delivery of Catalinas, before receiving command of the heavier, more complicated B-24 used in Consairway ATC operations.

This "learn-by-doing" method of developing a man through the various stages of flight training has been reflected in the absence of large training charges.

Today, Consairway has 37 flight crews, and another 15 crews are receiving instruction.

Payload per plane per trip has consistently been moved upward. Interior arrangements of the aircraft have been refined to provide more space for cargo transportation. Simultaneously, the aircraft's basic weight has been reduced by removal of unnecessary equipment, thus allowing a corresponding increase in the payload. Flight crews, becoming more familiar with weather conditions on the route, have voluntarily reduced the amount of reserve gasoline in favor of carrying a greater payload.

As additional Air Transport Command personnel have been stationed along the route, and as facilities have been improved at the bases, layover time at each stop has been slashed sharply. This reduction of non-flying time has permitted a corresponding increase in schedules and faster round-trips.

The crews get "learn-by-doing" training.

Recently, one Consairway aircraft flew the route round-trip, Hamilton Field to Hamilton Field, in the record time of four days and 43 minutes.

With its present complement of 10 aircraft, Consairway schedules have increased to approximately one each day. At the present rate one ship can be out of service and in overhaul at all times. During October of 1943, forty scheduled trips were flown.

On October 31, 1943, the Consairway plane departing from the United States represented the organization's 753rd trans-Pacific flight.

Arriving navigator unloads his equipment.

To Be a Part of This Age

By Flight-Lieutenant J. F. McEwen, R. A. F.

An Oxford graduate who was awarded Britain's Distinguished Flying Cross last November tells you about the impact of aviation on his generation.

WHEN the time comes to tell my grandchildren what I did to help win the war of the forties, I'll find it difficult to glamorize my part. What can you say about missions that run 12 to 16 hours without event — except that it's a long time to stay in one position, looking out over water?

The seven of us who fly Liberator Bomber "N" often can't even say for sure that we sank the sub we went after — not when we don't have any survivors for the experts at the British Admiralty to question, or any definite wreckage for proof.

This Liberator is the 21st make of ship I have handled, in training or operation. Among the others are most of the makes well known to British pilots: Mosquito, Spitfire, Lysander, Blenheim Mark IV (with the long nose).

The crew that flies with me helps demonstrate that flying is today an international business. They've come from all over the world to Iceland, where we have been stationed for a year's service — with a fortnight's leave to England every four months.

Our second pilot, David Ker, is a Scotsman born in Galveston, Texas, but grown up in England. Our navigator, Harry "Billy" Bates, is a smiling young lad from the east of England. Our first wireless operator and air-gunner, Norman D. Hartnell, comes from a spot 400 miles east of Fairbanks, Alaska. He reached Britain via the Royal Canadian Air Force and transferred to the R.A.F. Our second wireless operator and air-gunner, Harold Dixon, comes from Leeds. Our engineer, Patrick Fallon, is from Dublin in the south of Ireland.

My own life centers around Nairobi, Kenya Colony, Africa, where my father was in the Government administration. I went to school and college, then on to Oxford. Like most of the others, I never set out to be an aviator. But at Oxford they offered 100 of us college students the opportunity to learn to fly under R.A.F. supervision. We had no uniform, we received no pay.

The planes we flew then would look odd today even in a scrapbook, though this was only in 1934. You probably never heard of the Avro 540-K, or the Avro Tutor; nor of the Hawker Heart, nor the Gloster Gauntlet, nor perhaps the Oxford. Yet every one of those planes helped some little in advancing aviation to its power today.

When the war became a certainty, I remembered the flying they had taught us back in Oxford, asked for permission at Nairobi to go to England and join the R.A.F. The war put me into flying in half a dozen sectors of activity: Egypt, Iraq, Libya, over Norway, and now over the Atlantic.

HANDLING an aircraft such as a Liberator is a satisfying thing. These Libs have a lot of gadgets that make the flying job easier for the pilots. If it were not so we couldn't put in the long hours we do. When we establish our course and pull on the Sperry automatic pilot, we can relax and have a smoke. We keep our eyes open, but we don't have to be quite so tense. Floating along up there with all that power at your command permits you to think and to plan and to dream.

Naturally all of us do quite a bit of thinking about the post-war world. To my mind the whole world's future is wrapped up around aviation.

I think travel by air has only just begun. I think that many of these huge passenger ships and freighters sunk in this war will never be replaced. For most of the world's passenger travel is going to move from now on by air. The big steamship companies themselves realize this. Just awhile ago, for instance, the stockholders of Britain's huge Cunard line voted to change their charter to permit the company to build airports and operate air-liners, along with steamships.

Flying is now an international business. Every country has its flyers. Every lonesome spot of military importance already has its landing field, spaced out widely to accommodate the increased take-off and landing speeds of today's large planes. You'd be surprised how uniform the world becomes when viewed from above. The aerodromes — you call them airports — of Egypt (except in the desert) look much like the aerodromes of England, or Palestine, or any other country; wide runways, long enough to permit a landing at 105 miles an hour — repair shops — huts around the edge for ground-crew and visitors. That is the general pattern.

Flying has done much to unify and standardize the world.

It is our post-war job to help unify it on the basis of its best common denominator — not the common denominator of brutality and force.

Air travel till now has been costly because airlines operated only a handful of planes, and each passenger had to pay a large share of the upkeep of ticket offices and aerodromes and repair stations. Any company with maybe 50 air-liners has been forced to charge much more than would be necessary with a fleet of, say, three or five hundred air-liners. The whole picture will change when this war is over.

The young men and young women of the future are going to learn flying as simply and as naturally as the rest of us learned to read and to spell. Every normally intelligent youth will want to learn how to handle an airplane. We have practically come to the time when you have to fly, in order to be a part of this age.

This advertisement is one of a series sponsored by Consolidated Vultee Aircraft Corporation in co-operation with the Coordinator of Inter-American Affairs. It appears in South American countries in English, Spanish, and Portuguese. Similar advertisements are sponsored by the Company for placement by the O. W. I. in neutral countries throughout the world.

De "Jeeps" Voladores a Leviatanes del Aire

LIBERATOR . . . bombardero de 4 motores

El gigantesco "Liberator" tiene fama en todas partes del mundo. Armado con 14 ametralladoras pesadas, el "Liberator" puede volar 4.000 millas y tiene una velocidad máxima de más de 300 millas por hora.

LIBERATOR EXPRESS . . . transporte

La versión "carga-pasajeros" del "Liberator" puede llevar una carga útil de 10 toneladas y ha transportado personal y abastecimientos a todos los campos de batalla de los Aliados.

CORONADO . . . bombardero de patrulla

Un verdadero Leviatán del aire, el "Coronado" es el avión más grande y poderoso que la Consolidated Vultee ha puesto al servicio de la Armada de los Estados Unidos de América; puede permanecer en el aire 24 horas seguidas.

CATALINA . . . bombardero de patrulla

Conocido por muchos latinoamericanos, el "Catalina" es un avión que rehusa envejecer. Sus aventuras han sido variadas — desde el descubrimiento del paradero del "Bismarck" hasta sacar caucho de Manaos.

VENGEANCE . . . bombardero de picada

Los frenos de picada del "Vengeance", recientemente perfeccionados, dan a los pilotos de la USAAF y la RAF dominio absoluto al descargar sus 2.000 libras de bombas, asegurando la precisión de la descarga.

VALIANT . . . avión de entrenamiento

Centenares de miles de pilotos de la Armada y el Ejército de los Estados Unidos de América, la RCAF, la RAF y de algunos países sudamericanos, reciben su entrenamiento básico de vuelo en el poderoso "Valiant".

RELIANT . . . avión-escuela de navegación

Un avión favorito de aviadores antes de la guerra, el "Reliant" se usa ahora extensamente para dar importante instrucción sobre instrumentos de vuelo y navegación aérea.

SENTINEL . . . "Jeep" Volador

Liviano, fuerte, fácil de maniobrar, el "Jeep" Volador es "el ojo en las nubes" de las fuerzas terrestres. Ha ayudado a dar a la artillería americana la precisión más formidable en el mundo.

CUANDO HAYAMOS GANADO LA VICTORIA, la Consolidated Vultee Aircraft Corporation se encontrará en condiciones de proporcionar el equivalente de estos aviones para uso después de la guerra . . . desde "flivvers" aéreos pequeños para uso privado, hasta enormes aviones transoceánicos de carga y pasajeros.

CONSOLIDATED VULTEE AIRCRAFT

UNIDAS SIEMPRE

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Plane Talk

MAY · 1944

Why We Need 20,000 Airstrips • Air Luxury For Tomorrow

"Bombing Is Our Business" • Is That a Liberator?

Plane Talk

If you wish to share your copy of Plane Talk when you are through reading it, you may send it to a friend for 6¢. The simplest way of mailing is to slit a business-size envelope at both ends, roll up the magazine in it, seal and address and put on 6¢ in stamps.

MAY, 1944 • CONTENTS • VOL. II, No. 3

PUBLISHED BY CONSOLIDATED VULTEE AIRCRAFT CORPORATION

Front Cover

Navy Liberator in the Pacific

The Navy Liberator, or PB4Y, which in its essentials is the same plane as the Army Liberator, or B-24, is pictured here in a reproduction from an official U.S. Navy kodacolor film. The Navy is using land-based Liberators in steadily increasing numbers — for submarine patrol in the Atlantic, for assault on Japanese strongholds in the Pacific. For other Navy pictures, see "Air Sailors in England."

Back Cover

Bombing of Wake Island

This is an official U.S. Navy picture of one of the numerous bombings of Wake Island, which has had its Jap installations blasted by Liberators time and again since the Japs occupied it in December of 1941. Under Secretary of the Navy Forrestal recently announced the Navy would have produced for it a total of 28,000 combat planes in 1944, compared with 13,500 in 1943 and 238 in 1939, and that the air and sea strength of the Navy must be maintained at high level after the war.

Is That a Liberator?
Sgt. William S. Friedman of the Air Forces Training Aids Division tells you some tricks in aircraft recognition 1

Why We Need 20,000 Airstrips
William A. Mara, now on the staff of Consolidated Vultee's Stinson Division, explains a post-war aviation requirement 4

Guardian Angel for Airmen
From Randolph Field, where Flight Surgeons are trained for our Air Forces, comes this story of their work around the world 7

Desert Depot
Fred Barton, *Plane Talk* correspondent writing from Cairo, introduces you to some boys who nurse wounded Liberators nearby 9

Our Sunday Planes
Captain Art Keil, CAP, took some handsome pictures to accompany his account of the extraordinary work of the CAP Coastal Patrol 12

Bombing Is Our Business
Lieutenant Horace Lee Williams, USAAF, chats with you quietly from an armchair in the courtyard at Shepheard's Hotel 15

Air Luxury for Tomorrow
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The Squaw, which has come back safely from more than 70 missions and has seen two crews decorated, is introduced in full color 20

Counselling the Woman War Worker
Mary Shipman Jackson, Administrative Assistant to the Director of Industrial Relations, explains the Consolidated Vultee plan 21

Air Sailors in England
The boys who fly the Navy's Liberators are really sailors, speaking sailors' lingo and wearing sailor blues 22

Two Reports on our War in the Pacific:

Problems in Bombing Japan
Randall Gould, of the *Shanghai Evening Post and Mercury,* draws on his long Far East experience to tell how the Japs can take it 24

Air Leaps Toward Tokio
Major General Willis H. Hale, Commanding General of the Seventh Air Force, reports we are getting there in Liberators 28

No Milk Run
Arch Whitehouse tells in his breezy fashion how he spent more time than he'd counted on with some Liberator men in England 30

Edited by Hill and Knowlton for the Consolidated Vultee Aircraft Corporation and published every other month. Text and pictures have been cleared for publication with Government authorities. Text of any article contained in the magazine may be reprinted with or without credit to Plane Talk. Copies of most pictures, except those credited to commercial news agencies, can be made available to editors upon request. While manuscripts are not solicited, first hand accounts of experiences by men in the air forces at the fronts will be given careful consideration. All correspondence and address changes should be addressed to the office of Hill and Knowlton, Room 3301, 350 Fifth Avenue, New York 1, New York.

SAN DIEGO PUBLIC LIBRARY
BUSINESS DEPARTMENT
MAY 2 '44

Liberator over Mount Vesuvius, shortly before the volcano's eruption. (A.A.F. Photo)

IS THAT A *Liberator?*

BY SGT. WILLIAM S. FRIEDMAN

Air Forces Training Aids Division

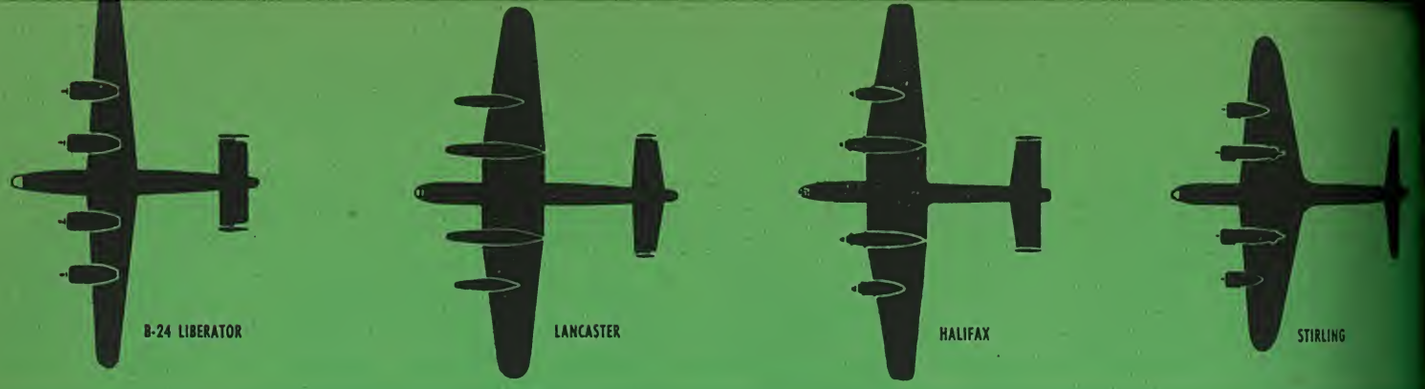
ARE you one of the many adults who secretly feels nonplussed when even your children can name a plane overhead, while you only wonder whether it's a bomber? "Yes, Pop, it's a B-24 Liberator. But is it a D or an E?"

You are in good company — don't feel embarrassed, and don't despair. The children have an initial advantage over you which has now been analyzed and put to adult use. The Army has been at work on your problem for its own sound purposes.

The advantage that children have isn't their better eyesight, but just a way of using their eyes. You, with your adult mind, pause to analyze what you see. The child, on the other hand, synthesizes details into swift, total impressions. Were it not for this gift, children would doubtless be overwhelmed by the complexity of the world they are born into, before they ever begin to grow up.

Now the Army became interested in the child's effective technique of observing, just because our airmen must recognize planes with instantaneous accuracy. Every man that rides a bomber, straddles a fighter plane or squints through sights at the enemy must be an expert in recognition. He must be able to tell the nationality and name of an approaching plane as soon as the enlarging spot in the sky draws close enough to have its form develop "personality."

Consider, for instance, how fast the nose-turret gunner in a B-24, cruising at 240 mph, has to make up his mind about a fighter making a nose-on approach at 400 mph. Is the fighter hostile? His apparent approaching speed is 640 mph. The man in the turret has no time for debate and analysis. He must simply reach into his memory and rapidly associate the approaching form



with a mental image stamped in his mind. He must not "identify" the plane; identification is a process of assembly of details. He has time only to recognize the "personality" of its total form, just as one would recognize familiar people on the street.

The Army Air Forces have now developed a program for such recognition training which, in recent months, has considerably reduced the number of combat accidents in our active theatres of operation. (*Combat accidents* is euphemism for a plane shot down by our own guns through faulty recognition.)

Early in the war, an identification process called WEFT was used. Aircraft recognition was taught by means of wall charts and similar graphics, which examined the *W*ing, *E*ngines, *F*uselage, and *T*ail of the planes being studied. With this approach the student was using a purely adult and intellectual method of learning. First analyzing a given airplane, he then compared the results of observation with memorized references, all according to a set pattern. This intellectual approach was just too slow.

Today the Army's basic recognition program is a system meant to restore youthful facility for unit perception. And it is getting swift results.

The basic course takes between 17 and 25 classroom hours, and acts as primary school for all recognition training. While the details of the course vary from post to post, principles are generally alike.

MOST of the "professors" at the Richmond, Virginia, school where recognition instructors are usually trained, are graduates of a special Army-Navy course in optical psychology. At Richmond, they teach with such simple classroom tools as the flash-meter, shadowgraph and ball-opticon.

The ball-opticon is just the old magic lantern, through which all kinds of pictures can be projected on a screen — clippings from magazines, drawings, and ordinary photographs. The shadowgraph is merely a taut sheet-screen with a light behind it; plane models mounted on a stick are interposed between the sheet and light to throw a silhouette-shadow on the sheet. The flash-meter or tachistoscope, used in most fixed school installations and in the better established field units, consists of a common 35-mm slidefilm projector, fitted with a leaf-type shutter, so that the length of the exposure can be accurately timed up to 1/100th of a second.

In teaching recognition with this equipment, the Army really has two jobs: it must first de-educate the student of his tendency to observe details piecemeal; it must then teach him, by flash observation training, instant recognition of airplanes he is required to know.

These planes are presented in the order of their tactical importance. During his early training the student studies "first-line" planes. It does not take much urging to make a gunner headed for the Southwest Pacific Theatre show interest in Zeke — the Mitsubishi Zero.

The instructor tells his class the plane's military purpose, dimensions, power plant and performance, armament, and bomb load. As these dimensions are given, a picture or silhouette of the plane is flashed on the screen.

Daily, the exposure is shortened. During this shortening process, the eye is trained to perceive the complete impression of the entire plane, devoid of minor details. "Major personality" of the airplane begins to emerge; the exposure shortening cumulatively inhibits any adult analysis. At the same time, the pictures exposed are gradually made smaller on the screen, simulating greater distance. By the time this phase of the training is complete, identification by analysis is out. The student is actually recognizing planes by form.

During the final phase of training, pictures are reduced in size to simulate the distance at which a gunner must make up his mind about the identity of an oncoming airplane, and length of exposure is reduced to a like interval.

The average American adult, wishing to "catch up with the youngsters" in airplane recognition, has to lay out a course of study for himself that is midway between the method of Sonny and the typical gunner. Physically, his job is like the boy's. He still has the privilege of standing on ground and surveying a friendly object with time to spare. But psychologically, his

CORONADO

43 PLANES YOU SHOULD KNOW

ARMY PLANES

Consolidated Vultee Liberator Bomber (B-24)
Consolidated Vultee Liberator Express (C-87)
Boeing Flying Fortress (B-17)
North American Mitchell (B-25)
Martin Marauder (B-26)
Douglas Havoc (A-20)
Lockheed Lightning (P-38)
Bell Airacobra (P-39)
Curtiss Warhawk (P-40)
Republic Thunderbolt (P-47)
North American Mustang (P-51)
Northrop Black Widow (P-61)
Curtiss Commando (C-46)
Douglas Skytrooper (C-47)
Douglas Skymaster (C-54)

NAVY PLANES

Consolidated Vultee Catalina (PBY)
Consolidated Vultee Coronado (PB2Y)
Consolidated Vultee Liberator (PB4Y)
Grumman Wildcat (F4F)
Vought Corsair (F4U)
Grumman Hellcat (F6F)
Vought Kingfisher (0524)
Martin Mariner (PBM)
Douglas Dauntless (SBD)
Curtiss Helldiver (SB2C)
Curtiss Seagull (SO3C)
Grumman Avenger (TBF)

BRITISH PLANES

Bristol Beaufighter
Bristol Beaufort
Handley Page Halifax
Hawker Hurricane
Avro Lancaster
De Havilland Mosquito
Supermarine Spitfire
Short Stirling
Hawker Typhoon
Vickers-Armstrong Wellington

FOUR GERMAN PLANES NOW SEEN IN THIS COUNTRY

JU 88
Focke-Wulf 190
ME-109
ME-110

TWO JAP PLANES NOW SEEN IN THIS COUNTRY

"Zeke" — Zero Type O
"Hamp" — Zero Type OF

like the aircrew member's. He, too, must surrender his long-cultivated analytical approach and reach childlike into his memory for a total-image association.

Like any other form of study, three basic units are required; motive, equipment and practice.

To learn anything well, you must start with an impelling motive. To the child, the airplane embodies the whole fascinating world that leaps out of still and motion pictures, and shouts itself over every radio news broadcast of the day. Liberators carry crusaders who level Ploesti and blast Berlin; Mustangs are the steeds of knights-errant battling to free a continent.

The gunner feels similarly strong urges. To keep from shooting at his friends, while spotting the enemy without a moment's loss, is the gunner's life insurance.

Your own motive is — shall we say? — just a desire to keep up with Sonny. All right. If your desire is strong, the rest will be easy.

Your equipment will have to be a compromise. Army recognition instructors issue to their students a set of flash cards — pasteboard strips a little larger than a playing card. Printed on one face of these are silhouettes of the front, side and top view of the airplanes on the Army's operational list; on the other face is a regular half-tone picture of the plane, with its name and serial number.

The Army uses these cards as a homework review aid. You can make up a set of them yourself. Virtually every important aviation magazine publishes three-view drawings for technical or recognition purposes. Most of them also get out a special issue on an annual or semi-annual basis, containing three-views of practically all operational types. Send for a back copy, and you can get all the pictures in one fell swoop.

Accompanying this piece you will find a suggested operational list of planes you'll want to know. Study the American types first, as these are the ones you will probably have the most opportunity to observe. Follow these with the British, Russian, German and Japanese. Start keeping a scrap book. Sonny probably does and, confidentially, so does the gunner.

Your pictures, as you collect them, should be pasted on one side of cards uniform in size. Allot a certain amount of time per day — say, fifteen minutes — to the study of these airplanes. Begin work by selecting a "plane of the evening." Locate all the views of it you can find, and study these from as many angles as you can — half-closing your eyes, just as an artist does, to absorb the total impression of the mass form, rather than details.

Then flip rapidly through your flash cards, and see if you can pick out the proper plane in your first run through. If you can, reshuffle the cards, and try it again.

During the early phases, when you have only a few planes memorized, this flipping through may seem a waste of time. But remember, you are simultaneously familiarizing yourself with many planes. And the next day's plane may not look so unfamiliar to you if you have seen it a couple of times during your flash card review. The next evening, repeat the operation, this time with a new card, discarding all you can actually recognize the first time around. Continue this process until you have mastered all the planes in the set.

You can test yourself by running through your daily paper or your weekly picture magazine. Actual combat photos are sometimes fuzzy, and if you can spot a Navy F6F (Grumman Hellcat) in some of the pictures that come out of the Pacific, you can consider yourself pretty good. Newsreels actually taken in battle can give you as good a workout as any. Some of them are a fair forecast of what the sergeant-gunner is destined to receive

In your studies, remember that while your interval for recognition isn't split-second, like the gunner's, you have to shoot for a short interval. For a ground observer, a full second is excellent, three seconds are good, and ten seconds are just passing mark (dub calibre among the kids).

The best indoor synthesis you can muster is having someone turn your cards up at twice an arm-length. This test is for standard cards, on which the ships appear to have about a three-inch wingspan.

The night you think you are good, ask Junior to shift cards for you.

P-47 THUNDERBOLT
CORSAIR
MESSERSCHMITT—110
MESSERSCHMITT 109F
JUNKERS—88

Here, as in the picture on the opposite page, the intent is to show how self-supporting projects can be dev
oped around airstrips designed for civilian flyers. Above is a suggestion for a country-club hotel. The
strip has a surface of well-drained turf, surrounded by hangars and service facilities, and generous par
areas for cars and planes. A hangar for float planes is provided on the lakeshore adjoining the swimming be

Why we need 20,000 Air Strips

By William A. Mara

Photographs from Models by Joseph R. Carleton and Robert Kittredge

In one way or another a large section of the public has concluded that the post-war sky will be filled with personally-owned airplanes. People correctly assume that great strides have been made in the design of easy-to-fly airplanes for the family. Helped along by enthusiastic writers they foresee an airplane in every garage and worry about solving the problem of "air traffic."

All of these bright dreams overlook the obvious. Everyone concedes that the plane is the swiftest method of transportation, but — people want airplanes in which they can go somewhere. They are not going to buy planes just to fly around some local airport on Sunday afternoons. There will have to be lots of airports in lots of places. Nor will a few widely-scattered big airports serve the need.

That is why use of the personal p
will literally grow from the ground
Inherently, the air is a limitless road w
runs directly from here to everywhere
it will be comparatively useless for civi
pilots until we have many more plac
ground available for their take-offs
landings.

The war has brought home the fact
today our very national existence dep

airports. England is such an airport, to our victory over Germany. Bloody Tarawa, Guadalcanal, Kwajalein, Truk, and hosts of islands yet to come are being made into airports essential for the attack on Tokyo. America pays dearly for such airports today, both in blood and dollars. But in the post-war era, wise planning and comparatively few dollars will give us a nationwide network of air roads and aerial markers for easy navigation that will make the airplane's advantages possible for millions.

In many ways the aviation industry stands where the motor car people were in 1918. There were vast production facilities then, and also the know-how to build better automobiles at low prices, *provided* volume could be secured. But — to get volume there had to be wide usage. So the Good Roads movement was born, and taxpayers were persuaded to finance it. How the automobile improved our way of life and created tremendous national wealth and employment is too well known to need repetition.

The airplane will offer after World War II a further means of bettering our living habits, enhancing our comforts, and of creating a new source of employment and national wealth. We shall have the designs, the production facilities, the know-how.

But engineers and production experts cannot carry through the job alone. Air roads must be provided to create the wide usage which will support production volume and low airplane prices.

This is a job which the public alone can do. You who read this article, as a member of that public, can be of enormous importance and help in your community. The smaller the town you live in, the more vital the job, and the greater the need for telling your neighbors about it.

Here's why. We shall come out of this war with about 3,000 airports of all kinds. A lot of them have been built for airline planes and for military operation. These are the big ports. They have long concrete runways to handle heavy ships. They are comparable to Grand Central Station. They necessarily cost a lot of money. Of course, the Grand Central cost a lot of money, too.

But these are not the types of airports which the small town can afford, or in which the personal airplane owner is even interested. Heavy traffic conditions at such ports will always put him at a disadvantage there.

What the family plane will require is the "Air Strip" in great numbers. Along with the air strip, the pilot will need a simple system of aerial markers or road signs. These will tell him where he is at any time, and so permit him to go from here to there without learning a complicated system of navigation, and also without depending on rivers, railways, highways and towns as a method of steering his course.

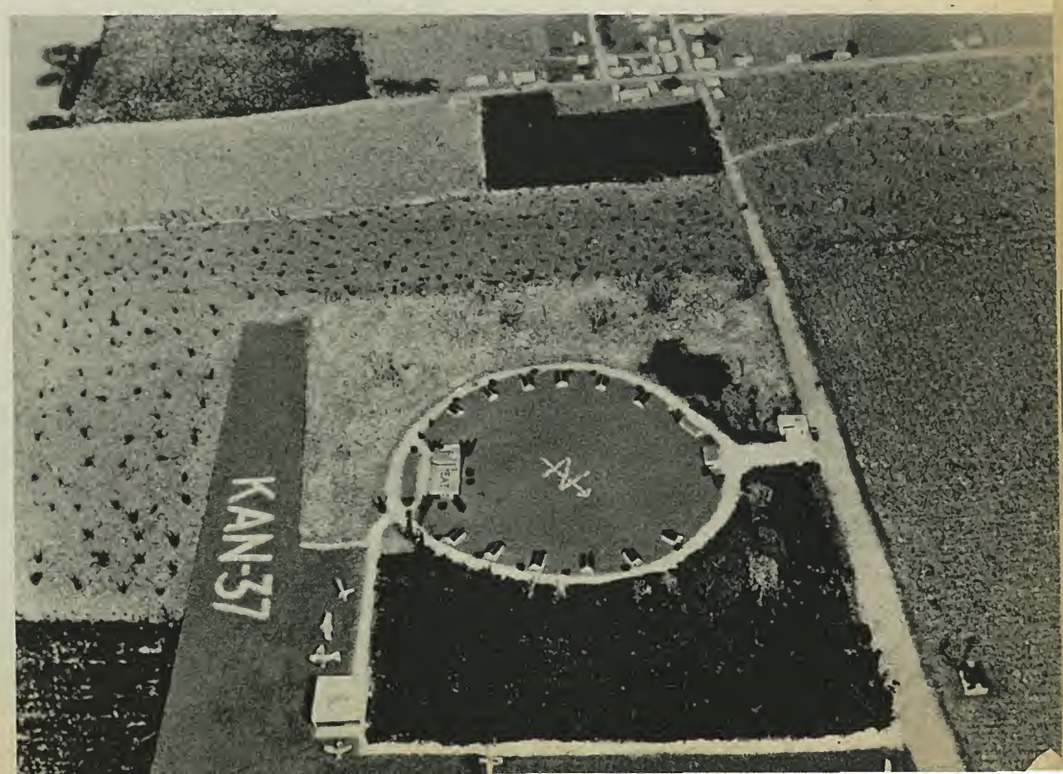
He must have these air strips at frequent intervals so that he is never more than a few minutes flight away from one. In this way there will always be a place to land in the event of bad weather. Large cities must have air strips conveniently located in a number of sectors to enable planes to land and take-off close to John Public's home or office. Slum clearance projects will become air strips in some towns. Golf courses, recreational areas, suburban developments, and hosts of other places must have air strips to attract and serve the personal plane.

WHAT is an air strip? Essentially it is a level grassy piece of land, perhaps 150 or 200 feet wide, and from 1,500 to 2,000 feet in length. It need not be hard surfaced, like our highways. It does need to be well drained. And above all it must be adjacent to a highway. Personal planes do not require the long distances for landings or take-offs that airliners demand. Consequently, the air strip should be confused neither in size nor cost with the airport for airline use.

Shapes which air strips may take are various enough to fit almost any available piece of land that has the required dimensions. Basically, they fall into four general patterns, depending on the land and money available for construction. These patterns are the "—", the "T," the "L," and the "X." All except the first permit landings and take-offs into the four basic wind directions. But even the simple straightaway "—" type will do in a pinch, for the post-war plane will be built with a tricycle landing gear (a wheel in front with the two main wheels beneath the body) which will enable safe cross-wind landings and take-offs.

Around the post-war air strip will grow airplane servicing facilities, a hangar, a restaurant, a sales room, flying club quarters and even a few tourist lodges for the traveler who does not wish to go to the city. Several of the larger oil companies are already making plans for service stations, so located on air strips, that the same station can fill the tanks of both the motorist and the personal plane owner.

Studies show that 20,000 air strips will be required to give us a national system of



Here is a possible "tourist court" development on a public highway, with an "L" shaped strip adjoining. Located a mile or two from the heart of a small town, such a development could have several sources of revenue: cabin and lodge rentals, food sales, servicing of planes and autos, sales of gasoline for both.

air roads. This number would provide for dividing the country into checker-board squares, with an air strip at each corner of every square 10 miles long in each direction. Such a 10-mile system of squares has been selected because each minute of latitude and longitude represents an average of 10 miles, and latitude and longitude will tie in with our national air marker system to permit the family pilot to find his way about without any difficulty.

Of course, mountains, swamps, and other obstructions will interfere with an exact 10 mile spacing. But the air strips should be located as nearly as possible in this pattern.

The cost is estimated at 90 million dollars. That sounds like a large sum of money, but it is less than twice the cost of La Guardia Airport, and is infinitesimal compared to the cost of a national highway system where a single mile of highway costs an average of $25,000. Compared to the task of paving the United States, which the automobile industry faced in 1918, the present air strip job is one which will scarcely touch the individual taxpayer's pocketbook.

The Civil Aeronautics Authority has proposed a project calling for 6,000 fields, which calls for Federal, State and Municipal cooperation in financing. In the end we shall need far more. However, as a start the plan is suitable, but limited in scope.

Oftentimes land with little commercial value could be used. In small communities with probably light traffic, good turf well drained is a perfectly satisfactory covering for an air strip. If the community supervises the land location, the facilities provided there will doubtless pay their own way in most instances.

Steps to bring air strips into being are being undertaken by many agencies.

The Personal Aircraft Department of the Aeronautical Chamber of Commerce is launching a campaign to publicize the air strip and to set up a body which will work with individuals and communities on their specific problems of location, drainage, grading, soil stabilization, and seeding.

The Planning Commissions of various States and Cities are also becoming active. The extent of their success will determine not only the use you can get from your post-war personal plane, but the price at which it can be sold to you.

Planned program reduces accidents.

SAFETY THROUGH SYSTEM

"Hazardous machinery? You're looking at a floor full of it. There are 106 machines in this department, each one a potential maimer—unless the operator knows what he's about and is wide awake."

That's the way the foreman of the sheet metal department at Vultee Field puts it when you talk to him of hazards and safety measures worked out to combat them.

Such an attitude, plus a plan, has brought to this department a winning record for safety. The rate has dropped from twenty-four lost time accidents in 1941, and sixteen in 1942, to nine in 1943.

Back of that record is a story of patience and experiment, going back to the time when the aircraft industry was attracting thousands of inexperienced persons, many unable to tell you the difference between a punch press and a cookie cutter. Machinery and its power was a mystery to them. All they knew was that you pressed a button or stepped on a pedal and bingo! — the operation was complete.

A raw newcomer was generally careful. But after he had gained a certain amount of proficiency, he'd get careless. Then things would happen. When you're working with machinery they can happen fast.

Plant safety engineers made valiant efforts to stem the ever-increasing accident tide. By and large, these efforts were rewarded. But the accident rate was still high in the sheet metal department with its punch and hydro presses, its saws, routers and shears, its sanders, grinders and shapers.

At this point the foreman in that department at Vultee Field took the bull by the horns. He chose eight of his best men to serve on a departmental safety committee — four from the day shift and four from the night shift.

The duty of each member is to report any unsafe practice of mechanical irregularity, and offer suggestions for improvement.

Good housekeeping and the enforcement of orderly shop routine are taken as the foundation of safety practice. A report sheet has been drawn up listing any factor that might be a safety hazard. It deals with machinery and its setup, with orderly arrangement of material, with cleanliness and neatness, with efficiency of shop procedure, with proper loading of conveyors, with the enforcement of traffic rules and with the proper condition of storage facilities, including tote pans, skids and tubs.

For one hour each Monday members of the department safety committee make a complete tour of their shop, checking off questions. Items listed are things like: "Are all guards in proper place on all machines?" "Are women using adequate hair covering?" "Is there any oil or water on the floor?" "Are aisles open?" "Is there any obstruction in the way of fire equipment?"

In addition to the answer column there is a space reserved for remarks. When the completed report is turned over to the foreman, he passes it to his assistants, who sign it and proceed to remedy derelictions.

A meeting of the whole committee is held once a month to discuss problems that have come up, and to submit and adopt suggestions for their solution.

A steady decline in the accident rate has been effected. The safety program in the sheet metal shop has now made every employee "safety conscious," and has been adopted in various other departments.

"Doc" opened his office in an eight by ten foot room in the corner of what had been a nuns' dormitory.

He treated ailments of enlisted men and officers and held daily "sick call" for hordes of natives who marveled at the white man's magic. "Doc" and four enlisted men waged war on the mosquito population, reducing mosquitoes from fifty to each square foot to one per square foot.

He organized a volley ball league, supervised construction of a mosquito-proof reading room, and begged enough paint for the men to brighten up their weather beaten quarters.

"Doc" wears a pair of golden wings. He is a Flight Surgeon.

The Flight Surgeon, whether in a nuns' dormitory in New Guinea or an Alaskan Quonset hut, has a full time job in keeping his men physically and mentally fit — the men who fly and fight, and also those who labor on the ground to send the air squadrons on their appointed missions.

The complex makeup of the men who are safeguarding the physical and mental health of the Army Air Forces is best described in the words of Brigadier General E. G. Reinartz, Commandant of the School of Aviation Medicine at Randolph Field, Texas. The General states:

"The Flight Surgeon is a combination of doctor, lawyer and priest — with a strong leaning toward the mental aspects of medicine."

General Reinartz observed the work of graduates of the famous Randolph Field school during a tour of North Africa. He returned from the battle front with high commendation for the manner in which alumni of the school were caring for the men.

"The morbidity rate has been lower than we ever hoped for," the General states. General Reinartz found medical officers turning stables into the best quarters in Africa. "The doctors took over old French winery stables," he says, "cleaned out the cobwebs, washed down the walls and sprayed the interiors with gasoline. Then they ignited the gasoline to sterilize the structures. The buildings were then furnished with double-deck bunks in each stall and bin. The thick concrete walls maintained cool temperatures during the terrifically hot days, and provided warmth for occupants during the bitter African nights."

Flight Surgeons live in the field with their men, share the hardships of soldiers' routine.

GUARDIAN *Angel* FOR AIRMEN

He's also called a Flight Surgeon, but he may not be a surgeon at all. He does wear wings; saves lives.

These Flight Surgeons are civilian doctors of yesterday — converted into all-around medical and psychological experts at the School of Aviation Medicine at Randolph Field.

Any doctor who attains his gold wings bearing the insignia of the medical corps, that mark him as the airmen's guardian angel, is the graduate of an ordeal. The rigors of college and internship are as nothing compared to the intensity of Randolph Field training.

In nine weeks there each M.D. not only reviews all medical knowledge pertinent to aviation medicine, but must master a curriculum designed to fit him for assignment to a combat squadron. His major studies include high altitude physiology; use of oxygen and oxygen equipment; diagnosis and treatment of specialized conditions resulting from flying; aero-otitis media — the effect of air pressure changes on the middle ear and the Eustachian tube; aerosinusitis, which may result from the effect of altitude on the sinuses; and the effects of flying on the whole psychological makeup of man.

On completion of this course he is rated as an "Aviation Medical Examiner." Then, possibly a year later — or sooner if he is in a combat zone and has proved his ability — he is given the coveted rating of "Flight Surgeon."

THE hangar line fades into the distance behind battle-bent bombers. Tail gunners see the red-crossed "meat wagon" sit-

ting on the ramp. The gunners, and every other man on the mission, know that "Doc" is standing beside the ambulance to see them off, and will be there when they come back. "Doc" will have a hot or cold drink awaiting them, and if any of them has stopped some shrapnel he will see they are given the best care and treatment within human resources.

The Flight Surgeon isn't earth-bound. He makes regular non-combat mission flights with the crews under his charge, in order to share with them the discomforts of high altitude and all other vicissitudes of flying. In cramped, sometimes bitterly cold quarters, the Flight Surgeon shares their hardships on the ground, too.

His courage under fire has been proved many times. The experience of Major Charles A. Baumhauer, now a Flight Surgeon at the School of Aviation Medicine, is more or less typical.

Baumhauer's home is Whistler, Alabama. His squadron was the first American unit to be assigned to duty at a New Guinea base. The field consisted of a narrow flying strip, two red-painted galvanized iron buildings and a few shacks. The medical officer and his four-man crew visited a nearby deserted village. Dishes, wash basins and other precious items were collected by the "forage" detail, to improve living conditions at the jungle base.

Handling of more seriously wounded or sick men at the base presented complex problems. The nearest hospital was 30 miles distant; the route was a rough road through mountainous territory. Only the most sturdy patients could survive the bouncing ambulance ride to the hospital. Hence serious cases were flown to Townsville, Australia, 800 air miles away.

The 29-year-old officer soon learned that his problems concerned not only serving airmen and ground crews, but cultivating the good graces of the natives. Sturdy warriors came from the jungles daily to answer "sick call."

All of the natives complained of "bad legs." Regardless of where they had a hurt — head, arm, stomach, or foot — they described their ailments as "bad legs." They apparently enjoyed medical service. After Major Baumhauer patiently treated each one until finally cured, he had to use diplomacy to convince his customer that it was no longer necessary to return for further treatment.

The squadron benefited from the doctor's work with the dark-skinned people, who offered their services for whatever projects the Americans needed completed. The physician included in his duties everything from sanitation to surgery. He selected sites for "plumbing," was instructor of classes for all the men in hygiene, also acted as morale officer.

For one piece of work with his men, he was awarded the Silver Star. "Doc" had taken refuge in a foxhole one day, during a raid in which 80 Jap bombers came over to blast his base. At the height of the raid, a badly crippled B-25 came in for a belly landing. A Zero was following on its tail, pouring in machine gun fire. Baumhauer disregarded the Jap bombers and the Zero, sprang out of his foxhole, and sprinted across the bomb-splattered field as the ship skidded to a stop.

Aboard were several wounded airmen. "Doc" labored until all the men were safely removed. For his work that day, the 29-year-old officer wears his Decoration.

Baumhauer returned to the United States after 17 months overseas and today he is using his experience to train other officers for their future assignments in the world's combat theatres.

ANOTHER young officer at the Randolph Field school who learned the hard way is Captain E. C. White of Wayne, West Virginia. Captain White went to England with a ground personnel unit, worked unendingly in his squadron as the men awaited transfer to the North African theatre. His unit was one of the first to establish an air base in North Africa on the heels of the invasion forces. Winter rains and cold brought hardships and some sickness.

Torrential rains washed the men out of their pup tents at least twice a week. The officer suggested the men use discarded packing cases to build stronger shelters. Soon the entire outfit was sleeping dry and warm, even if not luxuriously.

Service in the British army as a volunteer physician fitted Captain C. D. Howe of Pittsfield, Massachusetts, for his present duties as an instructor at the Randolph Field school. Captain Howe went to England during the blitz of 1941 as a volunteer. He remained with the British after the aerial bombings had subsided, and while serving on the "Gold Coast of Africa" learned much about malaria control. Now he is using that practical field experience to teach future Flight Surgeons how to combat malaria. Capt. Howe was transferred to the American Army in 1943, returning to the United States in order to go through the School of Aviation Medicine and officially qualify for his Flight Surgeon's rating.

Such men are representative of the understanding and ingenious medical experts who watch over the well-being of American air personnel, fighting the dangers of disease and injury, and the almost equally destructive mental strains of combat.

One strange antidote for air raid jitters inaugurated by a Flight Surgeon in New Guinea, is worth recounting. The base klaxon sounded an air raid alarm. Soldiers scurried to their shelters as bombs began to rain down on the field. Suddenly through the bedlam came the strains of "Claire de Lune," followed by a vocal selection by Richard Tauber. The all clear was finally sounded to the tune of "Blue Danube" with Leopold Stokowski conducting.

Major Albert A. Carp of Philadelphia, Flight Surgeon with the heavy bombers in fit, had prescribed the phonographic concerts. "Take one with every raid," he said. "It's good for the nerves."

Once these mask-shrouded officers were civilian doctors — here they train at Randolph Field.

Desert Depot

They set up a working organization to rebuild battle-shot Liberators — have saved taxpayers $5,000,000."

Dmitri Kodachrome

By Fred B. Barton

BOMBING planes will take just so much punishment, then go to the boneyard or repair-shop. You could scrap them where they drop. Or you can set up a desert repair-shop and overhaul planes stricken in battle.

That's what the U.S. Army has done over at Camp D on the edge of the African desert. D started in business in December 1942. During all of 1943 it was important in putting America's fighting planes back into the fight. It is still important, though as the war continues moving on toward the enemy its working parts will probably be put on rollers and moved closer to the fighting fronts.

An army is always improvising. The gang that got together at Camp D was typical American Army. A few were professional full-time soldiers — maybe 1/100th of one per cent. A few were trained airplane mechanics — perhaps two per cent. The rest were just average everyday Americans — salesmen, insurance men, college lads, business men of one kind or another.

They set up a working organization to rebuild battle-shot planes and put them back into the fight. They began with men who for the most part knew very little about working with tools, and often lacked some of the materials and equipment considered essential.

But they produced results. The workers at D shortened the war in North Africa and helped chase the Italians and Nazis out of Africa. They have put out over 1,000 planes, representing 21 different types, from B-24's down to small liaison or scout craft. They have serviced 170 big bombing B-24's, including 37 major overhauls. They figure they have saved the taxpayers of America $5,000,000 or more. That's a lot of war bonds.

D is just a spot in the flat sand, not far from the bright blue edge of the Red Sea. Now you don't land an airplane just anywhere in the desert and take off on the flat sand. You can't. The wind digs its holes, and nature roughens the sand. You need bulldozers to smooth out the sand, and asphalt runways. D has runways now. It has some buildings, with electric lights and wash-bowl-and-pitcher plumbing. It's one of those places where, before our men could start to kill the enemy, they first had to kill, and keep on killing, several million flies.

When I arrived there the brasshats made me welcome. Important as they are — the colonels, the adjutants, the special service officers — I shan't introduce you. This story deals just with the men who actually re-service airplanes, with their own bare hands.

STEP into the low cement office of Captain Carl E. Nystrom of West Boylston, Massachusetts, engineer officer. Sitting across the desk from him at the moment is Master Sergeant Robert M. Price of Detroit, Michigan. Price used to be a reporter and movie man. By the alchemy of Uncle Sam's army he has turned out to be a Grade A personnel man and king mover of Captain Nystrom's workshops.

"At first we had no spare parts to work with," says Captain Nystrom. "Sparkplugs we needed, the worst way. Thousands of them had been discarded, eaten into by sand. Every airplane in the world was using them like paper-napkins at a picnic and then throwing them away and yelling for new. They couldn't do much else. A defective sparkplug means a heavy engine and a plane that won't fly.

"So we picked a lot of discarded sparkplugs out of the desert and started to overhaul them. Eventually we overhauled 160,000 of them. But the job wasn't done with mirrors."

Sergeant Price spoke up. "Staff Sergeant Clarence M. Cash of Indianapolis solved most of the headaches of that department," he said with enthusiasm. "He used to be a sparkplug man back home. Cash had to use his American ingenuity. He made his test equipment from materials he had on hand. There were scrap-parts from sal-

vaged planes. Now and then somebody could find a discarded Eytie motor or something. Out of odds and ends he made a gap-tester that didn't look amateurish, and it did the job.

"Some repair shops pride themselves on turning out three to six conditioned spark-plugs per man-hour. We turned out 24 per man-hour. We could and did turn out 10,000 a week," says Price.

Staff Sergeant Clifford J. Shreve of El Paso was another of these workshop heroes who tackled a mystery and brought forth the clue that solved the puzzle. A lot of B-24s and B-25s came in with damaged turrets. These turrets had to be repaired or replaced. Before being put back on the bomber they had to be tested, to see if they would revolve properly and respond to the controls.

So Shreve, who is the son of an Army colonel, designed a test-stand on which they could place the top — or nose — or tail-turret and try it out. That saved a lot of time. Saved men's lives, too.

Tech. Sgt. Lawrence Gebauer of White Bear Lake, Minnesota, met another stiff challenge. He and his men built a balancing stand on which you place a propeller and get the blades at exactly the proper pitch. If the prop is out of balance, you understand, it will tear itself to pieces in the air. Got to be absolutely exact.

What's more, they had to turn out props in a hurry. To remove a damaged prop and put a new one back on used to take half a day. Recently Gebauer's gang were handed a plane that wanted to get back in the air within an hour. Could they do it? They unpacked a new prop from the crate, assembled it, tested it, and slid it in place. The plane took off 45 minutes after they got the job. Neat, eh?

Master Sergeant Wm. O. James of Centerville, Mississippi, meanwhile had some problems too. As head of the sheet metal department he started with a nucleus of men who didn't know much about airplanes but were eager to keep their flying brothers equipped with planes that would fly.

At first they didn't have much to work with. They had to re-build airplane bodies with nothing but flat sheets of metal for material, and sometimes even metal that had been salvaged from a hangar queen. They whittled and filed and hammered. They even cut their own jigs. But plane after plane got back into the air with its nose and belly all rebuilt, thanks to their tinshop technique.

Nowadays they don't have to rebuild the belly of a B-24 from scratch. The factory helps out there. The whole front belly section arrives from home now complete, ready to be slipped into place and fastened there. Nose-wheel door is ready; the whole vital front and underside of the plane, so often riddled by bullets, so often smashed flat by a crash landing, can be renewed in a few days. They're grateful to the factories back home for this help. But if the day's dog-fighting shoots up more planes than there are replacements for, they still know how to roll their own, so to speak.

These lads have reclaimed 60,000 separate items that started out as junk — shipped back from the fighting fronts at Bengasi and elsewhere in junkyard condition.

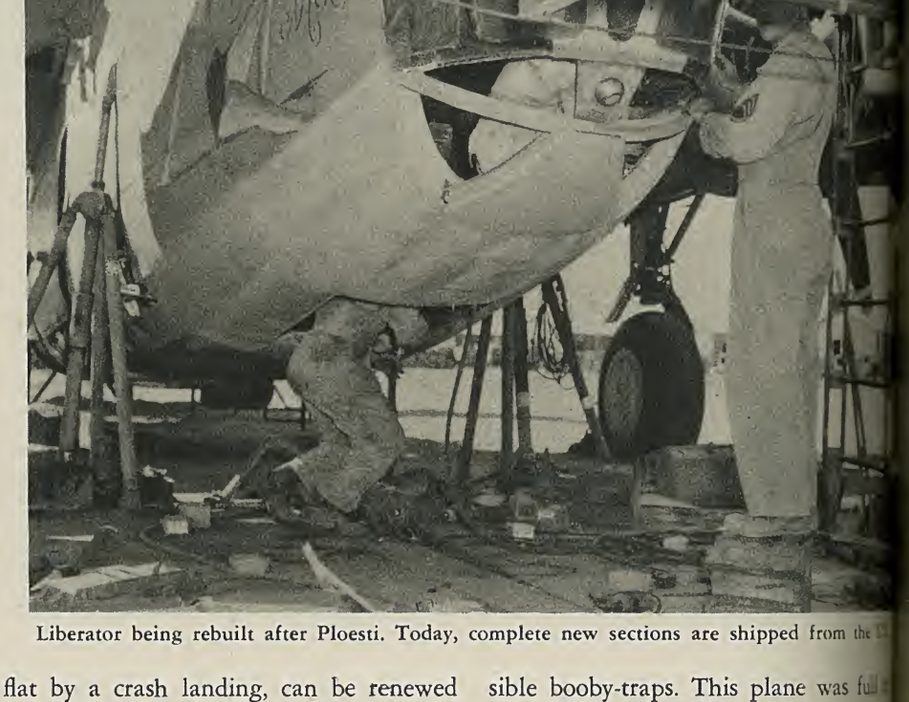
They have put out 28,000 accessories. They have reconditioned over 3,000 propellers, 3,900 parachutes, over 5,000 armor and turret accessories — from complete turret down to a part.

They rebuilt over 4,000 fuel cells and accessories — and because these fuel cells are of rubber and are hard to replace, that alone has saved the taxpayers a fortune. They rebuilt 708 superchargers — and those babies cost over $3,000 apiece.

Along with that they have shipped [illegible] over 5 million pounds of fighting freight by air to our various tactical units. This includes over 1,200 airplane engines, either new or serviceable, up to the front.

Remember when a Ju-88 was flown back to the States, to show our people back home what a Nazi fighting plane looks like? These men handled that little job. It was a problem then to search the plane for [illegible] sible booby-traps. This plane was full of them. Not just booby-traps, because the plane was never intended to fall into unfriendly hands without being blown to pieces. But it had plenty of things that went boom when some unwary person touched a button.

They managed to discover and un- the explosive bomb that was meant to blow the tail section to bits, making the plane unfit to fly if it should be captured. But they didn't discover — in time — another possible death-trap. Somebody touched a button, and an explosive charge inside the right wing went off. It was designed to cut loose the extra fuel tank when empty. The explosion singed the eyebrows of one of the workmen, but fortunately did no further damage. The plane was fixed up and flown home.



Liberator being rebuilt after Ploesti. Today, complete new sections are shipped from the [illegible]

In this shop in the desert, built from airplane crates, propellers are balanced with accuracy.

After the Ploesti raid, which shattered the Nazi's oil supply and quickened victory for the Russians, some B-24s landed in Cyprus, unable to make the long jump across water back to their home bases in Egypt. So this outfit loaded some men in planes and flew them to Cyprus. In two days they had all but two of the planes back in the air again.

In Sicily a bomber landed one day in a melon patch. There was simply no way to fly it out. But this gang sent over an overhaul crew. In 10 days' time they changed two engines, did necessary body work, and rebuilt the wings in which natives of Sicily (thinking the plane was fair prey for salvagers) had cut holes and drained out the gasoline. Then this gang made a temporary runway right through the melon patch, and flew the plane back home.

From D the first contingent of American mechanics went to Malta and operated there from February to November 1943. Malta was overnight host to a lot of B-24s that took off from Bengasi to bomb Italy and in some cases couldn't fly back.

So this desert air depot has serviced planes from Sicily, from Aden in the south of Saudi Arabia, from Tripoli, and other places. Even with North Africa out of the active fight, they are still kept busy servicing supply planes. Considerable ATC (Air Transport Command) flying goes through this area. A lot of stuff has gone through here, too, on its way to Russia. That includes hundreds of complete new airplanes.

No flyer flies very long without the daily help and thorough carefulness of such grease-monkeys.

The War Department doesn't award medals for doing humdrum jobs, no matter how vital, behind the lines. You only get a medal for going into battle and encountering the enemy.

So in this highly mechanized war, where (as someone figured) there are 18 men in the rear for every man actually fighting, a lot of such brave men and true are going into their second and even third year of the war without ever being able to write home "Mother dear, I am now a hero."

It is therefore pleasing to chronicle the awarding of a soldier's medal to two GI's who might, except for a freak, never have come to the public attention.

Corporal William J. Brothers of Memphis and Private Mark B. Leeser of Chicago are two enlisted men who work as radio operator and engineer on B-24s and other battlecraft "somewhere in the Middle East."

They represent the "crew" on one-way trips bringing battle-shattered planes back to the desert air depot for overhauling. Of necessity many planes they fly are held together with sticky tape and bailing-wire, so to speak.

It was on the night of December 21, 1943, that they picked up a B-24 over on the desert near Bengasi. For six months that plane hadn't been off the ground, and nothing had been done to it. A ground crew then had given the plane a brief overhaul, and then two lieutenants and Brothers and Leeser took charge of the ship for the run of two or three hours back to the air depot. Their job was to watch the instruments and if anything went wrong to fix it.

"We were flying along about 2,000 feet altitude," said Brothers, "and it was about 10 o'clock. A heavy electrical storm was going on. The radio went out. It was cold, and we had the flight deck closed in.

"Then, all of a sudden, I saw fire. It was an electrical fire, resulting from a stuck solenoid: too much juice going through and melting the contacts. It was our battery solenoid.

"I could see the fire through the navigator's dome and through the rudder-pedal cracks and around the radio panel. The flames lit up the whole inside of the cockpit. Smoke was coming up too.

"I yelled 'Fire' and started moving. Leeser had seen the flames almost as quickly as I had. We got the flight deck doors open. I went back to arrange the parachutes in case we had to leave the plane, then grabbed the fire extinguisher and came forward. Leeser meanwhile had grabbed the five-gallon water container and had doused the flames. He was quicker than I was: he put the fire out.

"Then I went up and turned off the battery switches. During the rest of that trip we just sweat it out, flying along without half our electrical controls."

The Army Air Force awarded them each a soldier's medal for that. If the flames had got back into the bomb-bay where the gasoline fumes were, it would have blown up the ship. So they handed Brothers and Leeser the handsome soldier's medal: blue on both ends, with red-and-white stripes in the middle.

In the dark of that night and the bad weather of December the plane made a rough landing. Fixing the plane was a three-day job. They changed one engine, replaced two propellers, and then flew the plane back to the air depot for a thorough check-up. It is back in combat flying now.

Cleaning and overhauling Liberator machine guns in primitive machine shop in N. African desert.

Our "Sunday Planes"

They have earned great honor in ...
ing coastal patrol work for the C...

By Capt. Art Keil, CAP Intelligence ...
Civil Air Patrol, Coastal Patrol ...

"Before Pearl Harbor they were strictly Sunday Ships — now they were in the scrap seven days a week, carrying loads way beyond their rated ca...

THE subs are no more of a coastal patrol problem now, but while they lasted they taught us a lot about airplanes.

We were standing beside a Navy runway in North Carolina, when I suddenly got the perspective on the whole business.

There wasn't much wind that day and the Navy fighter overshot. As he eased off his flaps and gunned a couple of thousand horses, the ground actually trembled and the roar was deafening. My eyes popped as he picked up incredible speed and vanished over the trees before the sound stopped.

"I don't believe it," I said.

The Major grinned. "That's the hottest thing in the air today. You're seeing something just off the test line. Finest piece of airplane engineering in the country. As soon as these kids get used to it, they'll take it into its first action. Right now it's a military secret."

At the other end of the two mile runway the Navy came in for a perfect landing. Right behind him, dawdling along, was the ship we had been waiting for, one of the Major's Civil Air Patrol ships, coming off Coast Patrol.

We saw the bright yellow of his wings as he banked for the runway. On a level with the windows of the control tower, he waggled as he went by, gave the impression of stopping to chat with the tower man. He was half way down the runway before he throttled back for his glide, landed a little short and had to rev. up a few notches to make the outer taxi strip at our end of the runway. Obviously the fighter runway was a little overbuilt for a Stinson Voyager, even with a heavy load.

"Now, there *is* an airplane!" The Major was so full of pride he might have been talking about an only son with the Medal of Honor. "It may be only a pup, but ... sure doing a man-sized job."

That's when I saw the whole pic... perspective. There, in the little 90 ... power personal plane, was as much an ... neering story as in all the hot fighters ... superdooper bombers in this war. ... Voyagers weren't designed for the ... the Atlantic at all. But they were ... fighting it.

Before Pearl Harbor they were ... Sunday Ships.

They were built for a couple of ... hours a year, flying in fair weather, ... babied, waxed and polished.

Now they were in the thick of the ... seven days a week, stopping only for ... and overhauls, working in all kinds of ... weather, carrying a load 'way beyond ... rated capacity, sucking up salt laden ... piling up more hours in a month ...

These Voyagers weren't designed for the Battle of the Atlantic at all. But they were certainly fighting it, and in all kinds of dirty weather."

used to fly in a year. They drew a different pilot every day, and different set of mechanics for checks and overhauls.

The new, hot warplanes, by comparison, were constructed to tough military specifications. When the engineers needed strength they added it, when they needed more power, they added it; when the metal wasn't tough enough, they just got Joe to invent a new metal.

But these same engineers, a few years ago, did a greater job when they designed these Sunday Planes. For these little planes are ten times better than they were ever supposed to be. They have proved it by a record of 24 million miles of overwater flight.

THEY are so sound, in basic engineering, quality and margin of safety, that they took the overloading and daily beating in stride. Despite the hazards of ocean flying in land planes, there were only 26 fatalities in the entire history of CAP Coastal Patrol — about one for every million miles flown.

There were only 90 planes lost or damaged beyond repair. And if the experience at our base is any criterion, most of the losses were due to "dunkings," which would have been just ordinary forced landings on a land operation.

At Coastal Patrol No. 3, we lost two ships in 18,712 hours of flight, did not injure a man. Both of these were "dunking" losses, would have been saved over fair terrain. Capt. Ted Keys brought his ship in from 10 miles offshore only to find a beach studded with posts as he ran out of altitude. He put down about 400 feet offshore in the surf. When the ship was recovered it was found that the longeron carrying the 100-pound bomb (which he had forgotten to drop) wasn't even bent.

In the other instance, Lt. Wiley Reynolds, Jr., was still getting about 1,900 revs. with a stuck valve, when he gradually lost altitude too far off-shore to make the beach. Over land, his chances for a pasture would have been excellent.

There were only three other forced landings from our base in nearly a year and a half. One ship was flown to an airport from eight miles off-shore, one landed on the beach and one on a road; none was damaged in landing. That doesn't include off-schedule landings due to weather. Several of the men were forced down on roads, beaches or fields, trying to fly when the ducks were walking. But, in all, this base lost only three days of flying in 17 months. We kept saying the law of averages was against us. But the ships kept going.

Ours was the third base to be activated

in the country, and one of the few to be entirely equipped with locally-owned personal planes. We have been flying as volunteers in 1st Air Squadron, Florida Defense Force. We went to work on Coastal Patrol three weeks after the service was inaugurated. On the average, during our tour of duty, we used 23 Voyagers, three Lycoming-powered Reliants, and one Wasp Reliant out of the Stinson line. We also had two Fairchild 24s, one Cessna 165 and one Sikorsky S39 duck.

The Voyagers were carrying two men and overloads up to 165 or 175 pounds. Life vests, flashlights, canteens and knives were needed for each man, with one large or two small life rafts, radio transmitter and receiver, and a hundred-pound bomb for standard equipment. The heavier craft carried 325 pound depth charges, with the lower fin cut away to give a couple of inches more ground clearance.

Our service problems were quite typical. A few weeks after we started hunting subs, we moved from Morrison Field near West Palm Beach to a new airport at Latana, a few miles south. Service facilities consisted of eight portable canvas hangars — capacity eight airplanes or one stockroom, one bomb stockroom, and six individual workshops. Later we built a hangar, but for months all checks and overhauls were done in the open, or with the nose of the ship poked in a portable. Open motors were "protected" by tarpaulins, but ships parked on the ramp got full benefit of blowing sand, salty morning dew, driving rain and burning sun. There was little turf and acres of raw sand in every direction.

Parts were not always easy to find after the factories turned to warcraft production and reserve stocks were exhausted. Each engineering officer either made what he needed in many cases, or hunted up an Army or Navy friend for material he could adapt.

During a base-hopping trip up the Atlantic Coast last summer I heard the phrase: "Oh, we've got a friend at the base over there," so often that it seemed a byword with Coastal Patrol commanders. They could always beg an extra hunk of wire when it was really needed. But if any of these personal planes had developed real bugs, even "friends" on the Army and Navy bases couldn't have helped much. The ships were old, as we think of planes in 1944. Unlike combat craft, they couldn't be refined or rebuilt to eliminate trouble.

From the start we had to keep 'em rolling. There was no place for a "hangar queen" if we had had a hangar to put her in. Schedules called for 14 missions a day, and when the hunting was good the boys often flew all day. For example, take a "hot" one-day page from the history of Base Three, in our early days when all hell was poppin' before the ships were carrying bombs or depth charges. I give you the official record:

"While continuing the search for survivors from the SS Eclipse, three missions spotted the submarine, about to attack another vessel. They dived on the periscope, drove him under. Other missions were sent out but made no further contact.

"The following morning dawn patrols found the SS DeLisle on the beach with a hole in her side about 25 miles north of the spot. Orders came through to extend the patrol to Daytona Beach, 190 miles north of the base, and planes staying at Melbourne each night made the north run from that port.

"The Melbourne patrol with Pilot Carl Dahlberg and Observer Earl Adams flushed a U-boat off Cape Canaveral at 0630, at sunrise. The enemy was trailing a tanker, his conning tower awash, when they turned toward him. He crash-dived one and one-half miles away, but 20 minutes later they picked up his slick, on a line between the diving point and the tanker. Meanwhile a Navy plane had answered the radio call for aid and Dahlberg led him to the slick. At 0704 the Navy unloaded depth charges and were later reported, *via* the 'grapevine,' to have scored a positive. Col. Reeves, in his commendation, credited the CAP crew with saving the tanker.

"Farther south, first patrols from the Base found three other victims of the night's raid. The Dutch freighter SS Amazone was down with just the tip of the mast visible and the U.S. tanker SS Java Arrow was floating with a huge hole in her side. Five miles south was the U.S. tanker SS Halsey, loaded with 40,000 barrels of naphtha and high octane gas. She had caught fire some time after being torpedoed, just as the crew was returning to life boats to go aboard. Searches for survivors occupied all missions.

"Late that afternoon, going into Melbourne for the night, Pilot 'Doc' Rinker and Observer Tom Manning flushed a sub off the Cape in such shallow water that the U-boat rammed its prow into the sand bottom as it tried to escape. A few minutes later the conning tower emerged as the sub backed out of the sand. The patrol ship over him at 400 feet, had nothing to drop on him but a smoke flare. By the time help arrived the U-boat was out of trouble and into deep water. It was later reported to the Base that Gen. Arnold issued the order to equip all CAP Coastal Patrol ships with bombs when he was shown a report of the mission."

Planes taking off for the dawn patrol.

On days like that, our regular four-hour patrol was likely to stretch into eight or ten hours with but one stop for refueling. It was a bit different from the pre-war Sunday hops of an hour or two.

Airplanes that will fly their gas load day after day, week after week and month after month, as did our Sunday Planes of the CAP, are planes to talk about. When the medals are passed around, strike off a special one for these little planes of ours. They and the fellows who kept them flying have done their work "in the highest tradition of American aviation."

By Lieutenant Horace Lee Williams USAAF

(By Mail from Cairo)

BOMBING IS OUR BUSINESS

WE keep our hats on while we eat. That's probably the first thing you'd notice if you dropped in at our base over in Italy for breakfast some morning. We wear them because there's no place else to put them.

We live in a swamp of mud that is cold and thick and gooey. You never get used to it. The only time you forget it is when you're up in the air in your bomber.

We get waked out of a sound sleep at maybe 4:30, maybe 5. It's raw and cold. We have a hot cup of coffee and gather in the briefing room. They tell us what target we are to go after — how high to fly — how to get there and back — and how soon to take off. What might amaze you is that everybody seems pretty casual about it.

Here we are, about to fly several hundred miles and bomb hell out of some unsuspecting factory or railroad yard or airport or dock. We climb into our Liberator bombing planes as if we were going to take a ride in a Fifth Avenue bus.

As navigator I've been on more than 30 bombing missions, heading into most of the occupied lands of Europe. It has been an experience I wouldn't take a million dollars for — although frankly you can have your war any time you like it and let me go back home to my farm in Texas.

When you spend 10 to 14 hours in a plane — when your whole present happiness and your chance for future life are tied up in the way that plane handles and flies — you come to trust and to love that plane as if it were something human.

Maybe men who fly other makes of planes come to trust and love their planes too. I hope they do. All I know is that I've done my flying in a Liberator named "Hiawatha."

Sometimes we have an escort of P-38s, and that is the most precious thing in the world. Every bomber pilot would rather have a P-38 alongside him than to have a beautiful blonde.

Not all of our risks are in combat. Sometimes men get killed on our home field.

I remember the day the runway of the field we were using was rough and had patches of water on it. The leading plane speeded up, but hit a bump that threw it into the air before it was ready. The plane became air-borne but lacked enough momentum to keep going. So it nosed down into the earth with a sickening crash.

The plane didn't explode. But the shock smashed up all seven of the crew, all of whom were standing in the radio compartment for the take-off.

It's tough enough when you see friends get killed in combat. But there at least they generally trade life for life. To see good men killed off just in practice missions and take-offs does something to you. It makes you feel bad all over.

We spend very little time, however, thinking about the men who go. You can't afford to let your thoughts become morbid and unhappy. When we return from a mission we slip over to the officers' club, pour ourselves a drink, and start talking about tomorrow's mission — or about the dance we hope to go to next Saturday.

When you face possible death every few days you study to simplify your life. For instance, you may notice I don't wear any finger-rings. No jewelry of any kind: none of these identification bracelets, for instance. Too much danger of that junk catching on something when I get ready to jump — if I ever have to jump.

I'll never forget the day I saw a fellow-American jump feet first from the nose-wheel door in a bombing plane. Something caught then. Maybe somebody else in his plane saw him and was able to help him. But — probably he was still there when the plane crashed to earth, as it did a few minutes later.

I don't want anything holding me back. There are enough things hanging around me as it is — my 30-pound flak-suit to ward off stray pieces of flak, my parachute harness, my battle-jacket, my flying boots.

Sitting here in the quiet courtyard at Shepheard's Hotel in Cairo it is hard for me to tell you what combat flying is like. Life is too comfortable here.

I'm no hero with a story to tell. I haven't shot down any enemy planes. (As navigator I'm not supposed to, but I've tried.) After all, my combat flying has been safe and uneventful.

I've met a lot of mighty good fellows. Men born to fly, you might say. Americans are the best flyers in the world. They take life easy, they have confidence in the planes they fly, they have confidence in themselves.

Take Italians, now. You can spot an Italian pilot as far away as you can see. He does everything by the book. And he likes to show off. (He generally does the showing-off at a safe distance.) Jerry, on the other hand, is a pretty good flyer, and when he starts coming he *keeps* coming.

But Americans top them all. To most Americans flying now in Italy, it's just a job.

We get what fun we can out of it. For instance, I'm taking some canned goods and food and three Primus stoves back to camp with me now, so we can have extra food in our camp. Not much there to spend money on — not much that clean American boys want, if you get what I mean.

We get fun, and we try to be matter-of-fact about the work. Uncle Sam hired us to bomb the guts out of the enemy. No use letting it get us down. We're doing it. Bombing is our business.

You enter here midships in the belly.

The doors slide shut behind you like an elevator's.

Air

Henry Dreyfuss has designed fine appointments for one of Consolidated Vultee's post-war airliners, Model 39

PASSENGER comfort and convenience are Henry D prime considerations for manufacturers ished ind and designers working today on the Consolid plane of the future. Safety is now prac tion has b cally taken for granted, as a result of some enormous advances in engineering. Luxu Although th ous comfort is the new problem, and the Corp industrial designer is already at work on Company M

New seating and sleeping arrangements own this greater space for passengers and baggage which can re original fittings of plastics and other new widely di materials — these and dozens of other The Drey provements are being created for the companying cious planes people will discover post-w plane i

Ahead, a map shows you the air-route.

How space is used: a lounge seat fills the doorway.

Aft is the serving pantry and a lounge.

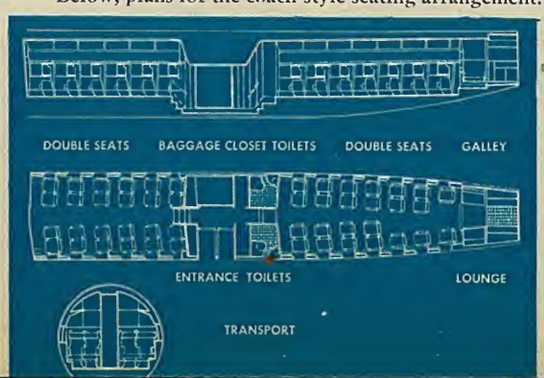
View aft showing seats placed in pairs, coach-style.

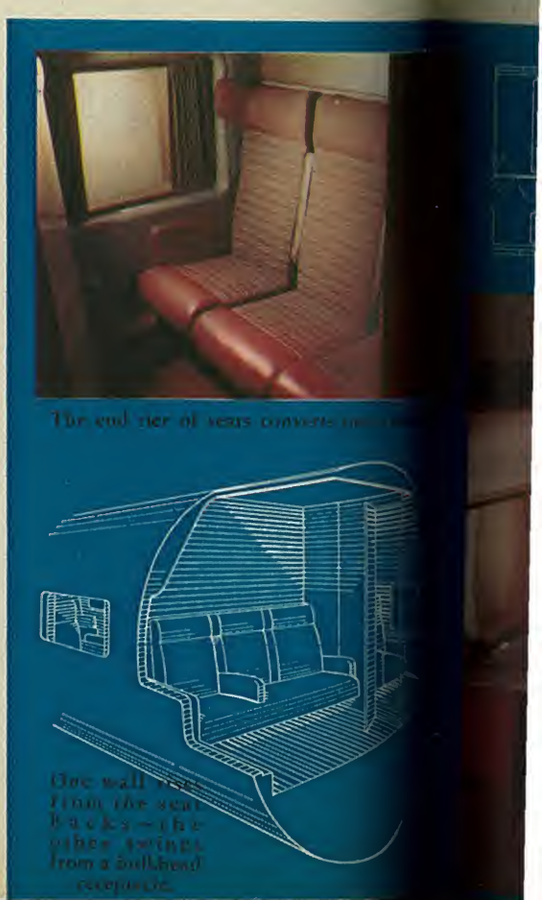
Each seat has its individual reading light.

Each reclines comfortably, has its own pillow-radio.

Below, entrance to mirrored lavatory.

Below, plans for the coach-style seating arrangement.





The end tier of seats converts to

One wall seat from the seat backs — the other swings from a bulkhead

Air Luxury For Tomorrow

Henry Dreyfuss of New York, distinguished industrial designer and consultant for Consolidated Vultee Aircraft Corporation has built a full-sized "mock-up" to show some of these coming innovations. Although the fittings are specially designed for the Corporation's first post-war airliner, Company Model 39, which is to be tested this spring, they illustrate details which can readily be incorporated in planes of widely diverse types.

The Dreyfuss designs shown in the accompanying illustrations provide not for one plane interior, but for four alternate possibilities, and also for combinations of the four. First is a conventional coach plan, with a center aisle flanked by pairs of easy chairs. (See left column pictures.)

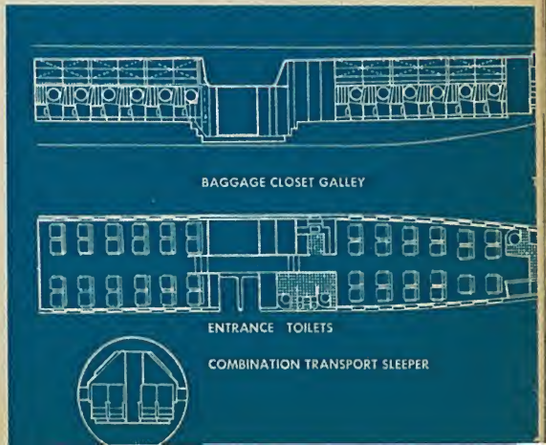
Second is a plan for breaking up such a conventional arrangement, to provide a feeling of much greater spaciousness. Here, as will be noted in the center illustration, seats are placed back to back, in groups of three and one; the groups are then alternated to eliminate the straight aisle. An effect of intimate privacy results, together with an impression of far more room for passengers. Actually, the seating capacity

Here is a back-to-back seating arrangement that gives an effect of great privacy and spaciousness, by eliminating the conventional center aisle. Similar in prevailing coach plans

These lounge chairs will convert into berths.

Two pairs of chairs make a bed 75" long.

The upper berth swings from the ceiling. Below are plans for the transport-sleeper.



of the plane is reduced through this plan by only four seats out of 48.

This back-to-back arrangement permits another innovation — a scheme for converting the end tier of seats into a completely private compartment. Often business men must work as they travel — or a traveling invalid may need isolation. Mr. Dreyfuss, as the center plan shows, has created an ingenious scheme for pulling one partition out of the back of three adjoining seats, and for swinging a second partition out of a wall pocket, to create a completely enclosed compartment section at the forward end of the plane.

The third scheme created by Mr. Dreyfuss is the most novel of all. It provides for chairs — arranged in pairs on either side of an aisle — that convert into beds. This plan creates a plane interior which, after use for daytime transport, is convertible for a return night trip into a sleeper with upper and lower berths. The comfortable individual chairs which permit such a conversion are of modernized design, completely different from any accommodations familiar on our present Pullman cars. (See the right-hand column on page 17.)

The fourth plan Mr. Dreyfuss has created is a more conventional and Pullmanesque arrangement for the long-distance traveler. As shown on page 19, the seats are much like those familiar on the railroad Pullman, and make up into berths in much the same way, though allowing more room and passenger comfort.

In the particular plane design used as a basis for his mock-up, Mr. Dreyfuss has divided the cabin into two parts — a division permitted by the high wing design.

The passengers' entrance is situated in the exact center of the plane. Two sliding doors built into the hull slide open like those of an elevator. Upon entering, the passenger is in a small lobby, faced with an air-map of the route ahead of him. Even in this entrance lobby Mr. Dreyfuss shows his genius for use of space. When the entrance doors are closed, two seats of plastic webbing fold down from a recessed panel and fit into the doorway area. They may be used either as extra passenger or lounge seats.

For the convenience of passengers boarding and leaving the plane, recessed coat closets are built at each side of the entrance; and back of the map is a luggage compartment. Additional storage space is located in the extreme end of the tail, together with a small lounge and a galley for serving meals.

The toilet facilities offer convenience unknown on pre-war planes. The woman's powder room, for instance, has a whole wall covered with plastic mirror.

THE seats for the day transport shown on page 16 are unusual. Their design is derived from the wing chair familiar in family living rooms. An individual reading light is built into the left wing, so spotted that it falls directly on the lap. The other wing houses a "pillow radio," which permits the passenger to hear programs without annoying his companion.

Space is provided for the passenger's small baggage, such as an overnight case, beneath each seat. Overhead, the baggage rack doubles as a hand rail. Thus a passenger has immediate access to his small personal effects without visiting the luggage room.

Seat upholstering conforms to the body's contours. When the passenger presses a button, the back reclines and the seat slips forward, dropping slightly at the rear to offer a more comfortable lounging position.

For his day transport, Mr. Dreyfuss suggests large windows, with sliding shutters of translucent plastic.

The two seating arrangements which are designed for converting into sleeper berths at night use seats somewhat different in character.

In the novel plan for using convertible chairs, shown on page 17, the chair is designed without wings, in interest of convertibility. These chairs operate in series of four to make a lower berth, with an upper berth over it. The result is that a 48-passenger day plane may be converted to a 24-passenger sleeper transport, while the plane is in full flight.

Using standard seating arrangement, wherein all passengers face forward, a 36-inch by 75-inch berth is effected with two pairs of chairs. Backs of the first two straighten to stand perpendicular to the floor, making a wall; backs of the next pair lie down as the seats slide forward; and — repeating — the backs of the next pair of seats operate just as the backs of the first, creating a wall to isolate the adjoining berth.

Above, the mirrored retiring room; the mirror is not glass, but plastic. Right, top, an alternate seating arrangement for sleeper planes that provides Pullman-like divans. Right, bottom, the divans made into berths

When the panel housing the upper berth is opened, two upper end-closures extend the side walls to the ceiling, to form a solid compartment. Lightweight bedding materials and lightproof curtains are stored in the upper berth when not in use.

A modern idea in visual comfort is used by Mr. Dreyfuss for such sleeping sections in the form of Polaroid windows that allow a passenger to select variable densities of

ght, from bright sunlight to complete darkness.

In his interior designed to show a sleeper plane fitted more conventionally like today's Pullmans, Mr. Dreyfuss offers the sofa seats pictured on page 19. Designed in a

style familiar to present-day railroad travelers, they are wider and broader than Pullman seats, are equipped with lounge pillows, and are correspondingly comfortable. Tall men will be happy to learn that six and a half feet of bed length are provided by this "Pullman" design. The passenger in the lower berth sleeps approximately 17 inches off the floor. The passenger in the upper berth has his own window built into the fuselage.

The berths on both sleeper designs are entirely self-contained, and each can be made up in less than five minutes' time.

These new designs provide space more efficient and more flexible, in meeting the changing demands during year-round operation over long routes, than any yet devised. All of the four seating arrangements, for instance, can be used in combination with each other. If passenger requirements over the route on which the ship operates are such that both back-to-back and conventional seating are wanted, both types can be installed. Similarly, one section of the ship can be furnished for day or "coach" passengers, while another section can be fitted for sleeper passengers.

To select his fittings for the interiors, Mr. Dreyfuss made a survey of suitable lightweight products of manufacturers all over America. A room was set apart for assembling samples of textiles, plastics, lightweight metals, and all mechanical innovations of possible aid to the traveler.

Colors were given special study. It is interesting to observe that Mr. Dreyfuss seeks to surround his plane passengers with earthy colors. Soft browns dominate. He feels these give the air traveler a greater sense of psychological security. In the role of artist as well as a designer, he puts great stress on the need of assuring the passenger psychological comfort (which is usually an unconscious reaction) as well as the more obvious physical conveniences which passengers appreciate.

The need for weight economy is a carefully calculated factor in every part of his design work. Some airlines believe that an extra pound in plane weight costs $50 a year in lost revenue. Hence resin-bonded paper, plastics, thin wood veneers that are bonded to paper or aluminum, are used to save all-important poundage.

Upholstering is of special weaves. Loosely-woven strong cloth is used to provide sound-absorption. Lightweight leather is used to finish the plane's main bulkheads, both to add a luxurious feel and to provide maintenance ease. Floors are covered by lightweight carpeting.

Colors, as already noted, are chosen to make dark tones to dominant. Warm gray and rust brown are used in one interior scheme. Wood brown and soft green are combined in another.

Many details of the Dreyfuss fittings, unimportant in themselves, show the care and imagination expended on his designs. Thus soap is provided for the washrooms in the form of soap-impregnated paper, instead of heavier bars. In the seating scheme of the coach, for instance, the seats are canted at an angle of five degrees of a right angle to the line of flight; the effect is to move the seat on the aisle slightly forward, so that the passenger there is given more visibility and a feeling of more privacy.

All of the Dreyfuss work in interior plane designs, it need hardly be emphasized, is in the nature of creative thinking for a future not yet here. Consolidated Vultee is straining every present capacity to produce the planes our fighting men need today; Model 39, for which these designs have been specially created, will not be put into commercial production until the war ends.

I. M. Laddon, executive vice president of Consolidated Vultee who is known internationally for his famous Liberator design, emphasizes that Model 39 is not the biggest plane being created by the Corporation's engineers; but it does illustrate in size, load capacity and speed the type of plane that many believe will be most practical during the initial stages of the post-war development of air-routes. With a top speed of 270 mph, and a maximum range at 200 mph of more than 4,000 miles, it will fly 48 to 52 passengers and baggage non-stop over the longest trade-route ocean crossing. According to Frank Learman, vice president and general sales manager of the company, a plane of this capacity should be no less in demand for domestic service than for trans-ocean crossings.

Model 39 incorporates the highly successful Davis Wing, power plant and landing gear of the Liberator bomber — features which have helped make the Liberator the greatest long distance heavy bomber America has put in the war theatres to date.

The first 39 will probably have been test-flown before this reaches the reader.

Hero's Return. *Here is a returned hero, gallant in parade dress — the Liberator called The Squaw, which flew on more than 70 missions over Hitler's Empire, dropped 360,000 pounds of bombs on his war machine.*

The Squaw first flew to battle in 1942 from Lakeland, Florida, manned by a crew under Major Joe M. Kilgore of Mission, Texas. After 30 missions the Major came home wearing the Silver Star and with his whole crew safe, some decorated with Purple Hearts. The Squaw stayed on in battle for awhile, was then brought home for a tour of the production front under another gallant and bemedalled crew piloted by Captain Royden Lebrecht of Denison, Texas.

Today The Squaw wears so many patches and repairs that only a portion of the original plane is left. Her new coat of gleaming paint is splotched to show where wounds are concealed, a great map has been applied to show her missions, and Lebrecht's crew have posted on her the name of their team, the Pyramidiers.

Over the routes The Squaw travelled now stream great squadrons of newer Liberators, in air missions that have as their first goal the destruction of Nazi fighter plane strength and production, and second, the destruction of Germany's key war-making industries.

By **Mary Shipman Jackson**
Counselling Director
For **Consolidated Vultee Aircraft**

Counselling the Woman War-Worker

SYSTEMATIC training of women as industrial counselors, undertaken by the San Diego Division of Consolidated Vultee Aircraft Corporation, has met with such success that the training courses are now being extended to the majority of its airplane factories throughout the Country.

The counselling program is based on the conviction that the woman employe needs a friendly listener of her own sex with whom she may discuss her problems in absolute confidence, and from whom she may obtain intelligent, impersonal advice. The woman counselor offers guidance not only on work problems, but also on personal matters related to job and adjustment to factory life.

Though aviation is the youngest major industry, it leads the country in the number of women employed. Consolidated Vultee is pioneering in a field of human relationships much more intimate than ordinary dealing between worker and employer. Company management and women workers alike have been gratified by the results.

One of the most vexing problems in production has been the high percentage of "terminations" of employment. In one three-months period at the San Diego plant, 8129 employes left their jobs after giving "personal affairs" as the reason. To get at the root of "personal affairs", which in sum total were affecting war production, and to assist in straightening them out so that women might continue in their jobs, has been one of the primary objectives of the woman counselor program. Its effectiveness may be partly measured by "termination" figures for the most recently available three-months period, in which the previous figure of 8129 job terminations due to "personal affairs" had been cut almost 25 percent.

Personal adjustment of the individual to her job was seen as the key to the problem. The vast majority of the women were engaged in unfamiliar work. Many were on their first jobs. Nearly a third were married women with children. Several thousand had husbands in the armed forces. Some were grandmothers. Others had only recently left high school. The complexities of putting in a 14-hour day at the combined job of building airplanes and maintaining a home were too bewildering and fatiguing for many. So they "terminated".

The solution called for new techniques, based upon a new attitude. An organized system of counselling by properly trained women was needed. It must be standardized but not rigid, it must follow carefully outlined procedures, yet be adaptable to personal circumstance. Above all, it must win the acceptance of the workers and to do this, must have a basis of complete mutual confidence.

TWO cardinal principles underlie the work of the counselling program. First, women counselors are never disciplinarians. They are advisors and consultants to foremen and employes alike, on problems that the foreman feels the counselors can best handle, and on problems the worker prefers to discuss with them. They do not usurp the functions of departmental management by any attempt to provide discipline, or to enforce observance of company rules. Second, their relations with women workers are strictly and completely confidential. Information of a personal type offered by a woman worker is not passed on even to her foreman without her consent.

Universal adherence to the letter and spirit of these principles has been largely responsible for the effectiveness of the woman counselor program.

Once it was established that the function of the counselor is to assist in adjustment to the job, but not in direction of it, the selection and training of a corps of counselors with the proper qualifications was viewed as a major managerial task, requir-

ing months of study, planning and laying out a systematic method of operation.

It seemed from the outset that the right kind of counseling talent ought to be found somewhere among the 40,000 women who already were employed by Consolidated Vultee. Women somewhat familiar with some phase of industrial work and already identified with the Company had obvious initial advantages over outsiders.

This surmise proved to be correct. But putting it in practice involved diligent search of personnel records, and many patient weeks spent in interviewing prospective counselors. For example, in order to obtain the 40 women needed at the San Diego plant, the company's largest establishment, where the system was first installed, 250 women were considered, and about 100 were interviewed. Of these, 60 took the training course, and 40 were ultimately assigned as counselors. A similarly careful advance selection is being made in each of the other plants as the counseling service is installed there.

The preferred candidate for the position of woman counselor is a woman between 28 and 45 years of age, who has formed good work habits and is used to the discipline of work. She must realize that combatting labor turnover among women employes will rest to a large degree in her hands, and she must view her work as important and serious.

The ideal counselor is possessed of poise and is neat in appearance. But extreme good looks are not an asset here, since women workers will often hesitate before consulting a woman who is too good-looking. She must have dignity and kindliness of manner. Her voice must be well-modulated, not too high in pitch. Diction also must be excellent. Voice and diction cannot be trained into her during the course, though their importance is emphasized; for in time of stress both will revert to their original levels.

College training is not of particular importance. Women who have had experience in meeting and dealing with people of various types in the course of a day are particularly apt candidates.

In the training course, the student is drilled in factory practices and policies, so that she will be able to answer any question about them. She is familiarized with the city in which the plant is located, its residential, school and recreational facilities. She becomes a walking information bureau; she is filled with facts and is taught to retain them.

ACCLIMATING women employes to their life in the plant at Consolidated Vultee has become a major function of counseling. A counselor meets a newly hired woman when she comes to work the first day, takes her through her building and points out time clocks, restrooms, and first aid stations. The counselor then introduces her to her department head. Within the first week the counselor requests the new employe to come to her office to talk over her work or adjustment to her department and to her surroundings, and

Pilot and co-pilot of a Navy Liberator, in light of instrument panel, prepare for take-off.

Below: A Naval Lieutenant from a near-by Liberator base says hello to friends in town.

AIR SAILORS IN ENGLAND

Air crewmen celebrate their leave in London.

discusses more things pertaining to the woman's department and job.

If the counselor feels now that the job adjustment has been good, her contact with the employe goes no further, unless the employe or foreman should wish to contact the counselor again. If, on the other hand, she feels that there has been a maladjustment of the employe, she tries to ascertain all reasons for this misplacement or feeling of unrest, and as soon as she has all the facts she directs her actions through the proper channels to rectify the condition before it has gone too far.

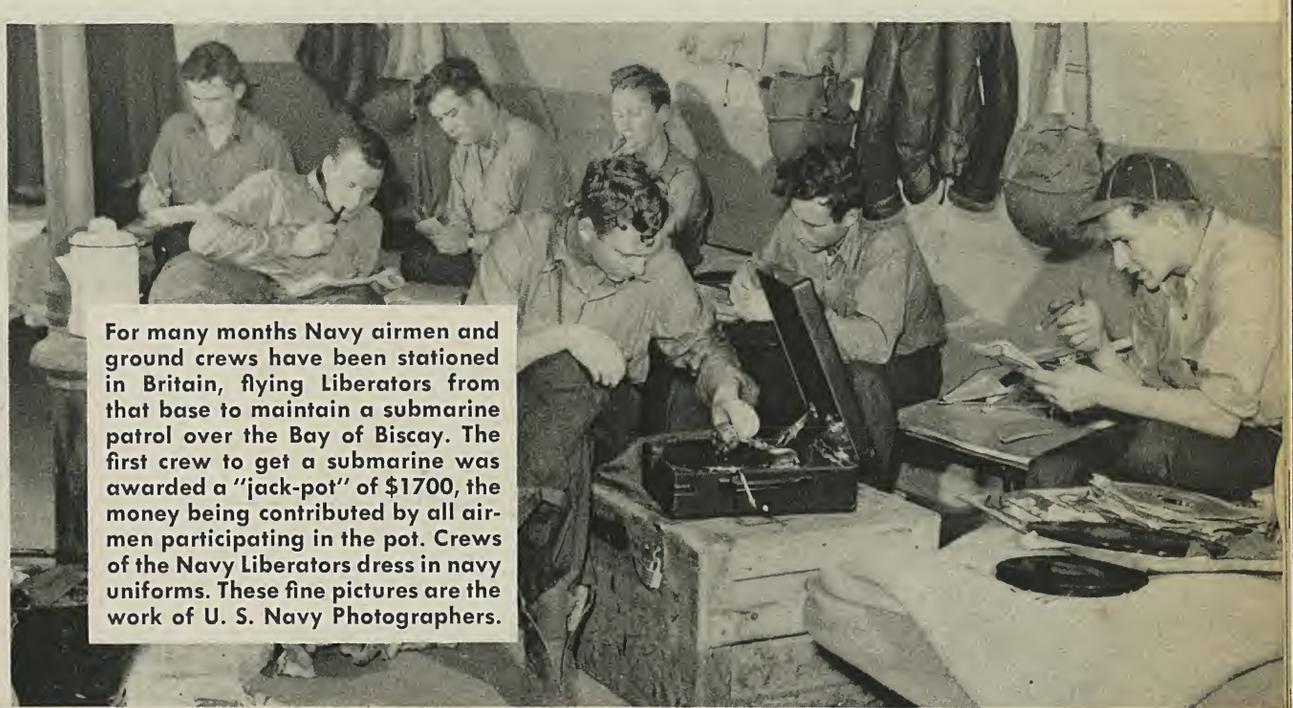
In divisions where the medical department had installed job-coding and physical-coding, the counselor assists the foreman by seeing that during a mass transfer or a "quick loan", where employes change from one department to another, they are physically coded to do the work. Often, at a time like this, the move between the two departments concerned is made too quickly for either the foreman of the department making the transfer, or of the one accepting it, to realize that certain employes are not physically fitted for the job that they are to do.

Foremen busy over production problems sometimes overlook the fact that 45-year old Mrs. Smith, who is the mother of four children, should not be working in a cramped position inside the nose of a Liberator. This is where the counselor comes to the rescue of both women and foremen. Upon investigation of such a situation, she brings to the foreman's attention the fact that Mrs. Smith should be given work suited to her physical code. The woman is benefited by being changed from work which might cause her physical harm, and the company benefits from increased production when the woman is given a job she is physically capable of performing.

The counselor makes it possible for any woman employe to receive emergency messages from the outside promptly and under considerate conditions. With a personnel gathered from all over the world, hundreds of messages a day are received. If a death has occurred, for example, and the employe needs advice and help, or a company car to get into town, or railroad reservations, or what not, these are provided as a matter of courtesy.

The personal lives of employes are considered their own affairs, and counselors do not attempt to solve personal problems not related to the job. They do work with agencies, such as the Child Care Center, and with school authorities, in order to help adjust practical family problems and thus enable workers to continue their employment. They help recreational centers to organize entertainment that would be of interest to employes on all three shifts, and keep employes informed of this entertainment. They give advice on community organizations that will render service to employes.

By and large, however, their responsibility ends at the factory gates. The woman counselor program has been devised to help women workers regulate their own lives, not to do it for them.



For many months Navy airmen and ground crews have been stationed in Britain, flying Liberators from that base to maintain a submarine patrol over the Bay of Biscay. The first crew to get a submarine was awarded a "jack-pot" of $1700, the money being contributed by all airmen participating in the pot. Crews of the Navy Liberators dress in navy uniforms. These fine pictures are the work of U. S. Navy Photographers.

They live in Nissen huts, stove heated, drink lots of coffee, play the "gramophone," hope for exciting developments. Below: Silhouetted in the English dawn, Navy Liberators seem crouched to spring to their patrol mission.

PROBLEMS IN BOMBING Japan

Randall Gould is Editor of the American Edition, and Associate Editor of the Chungking Edition, of the Shanghai Evening Post & Mercury, which is now published both in New York and China. He lived and worked in Japan in the early twenties, thereafter made frequent visits to Japan from his headquarters in Peking, Manila, and Shanghai until he returned to this country in March of 1941. He revisited China in 1943 and returned by plane in November.

BY RANDALL GOULD

A WONDERFUL little people, the Japanese! But — not so wonderful that another Doolittle raid or two couldn't virtually destroy their toy country, set fires raging through millions of their wood and paper houses, terrify them out of their few wits, and bring Emperor Hirohito cringing for terms of surrender. So millions of Americans have patronizingly thought, and most of them still look for quick, easy victory, once America's admittedly wonderful Liberator bombers start to march across Nipponese skies.

Maybe. There is nothing wrong with our Liberators. The only uncertainties lie in the other camp.

First, what about those wood and pa houses? They exist. But their construct isn't so simple as generally thought. E to keep standing through Japan's virt daily earthquakes, flexibly yielding shock, and with their weight carried timbers up-ended on hollowed-top st they will endure even bomb conc

against which they are proofed by the accident of being in an earthquake zone) far better than many of our Occidental structures.

They are seldom more than two stories high. Isolated country homes still have dry thatched roofs. But in the cities the roofs are mostly of tile, or sometimes of copper – good armor against incendiary flames or sparks even though unable to stand a direct hit. Mud stucco often covers all sides except the southern or garden exposure.

Most important of all is Japan's fire experience, and her years of reconstruction based on that bitter-bought experience. Fires in Tokyo are with good reason called "Yedo blossoms" (Yedo is the ancient name of Tokyo). In 1657, for example, half of the city was destroyed by fire, with a loss of 107,000 lives. Yokohama has been wholly destroyed by fire at least three times.

Fire is therefore no novelty in a country which has even developed special names for a large variety of conflagrations or circumstances having to do with them. "Tsuke-bi," for instance, means an incendiary fire. A fire starting in one's own house is a "jikwa." A fire originating next door is a "morai-bi."

For decades, and particularly since the great earthquake fires of 1923 in Tokyo and Yokohama, a vital factor in all city reconstruction projects has been the provision of wide "fire lanes" designed to keep conflagrations from spreading — whether originating from quake, air-bombing or other cause. Historically the great enemies of Japan have been "kaji to jiishin," fire and earthquake. And air-bombing is only a human-wrought combination of the two. Japan unites safeguards old and new to meet today's perils.

And she is prepared emotionally. In the words of Hillis Lory, who was onetime member of the faculty of Hokkaidi Imperial University and author of *Japan's Military Masters*: "Japan was the first nation to be air-raid-minded. Since 1933 she has prepared the nation physically and psychologically for enemy bombings. Anti-air-raid drills in Japan simulate the real thing."

All of us who were in Japan during recent years have vivid recollections of these drills, in which every carefully disciplined Japanese takes a part. Women suddenly appear at the alarm in "mountain trousers," nipped in at ankle and baggy above, to do their part in heavy work. Army planes, representing the arrival of an enemy, drop dummy bombs — incendiaries colored red, explosive projectiles indicated by white paint, yellow for gas, black for time bombs.

A Civilian Defense Corps is ready at any hour. Each home must keep water and sand ready. And, as was noticeable during the 1923 conflagration, such cities as Tokyo have half-forgotten ancient wells and palace moats to draw on, if water mains are broken.

Everything in these mock drills is as close to real air-raid conditions as may be. It is part of Japanese training to be ready for emergencies which historic experience has shown are always around the corner. Visitors as far ago as 1935 were struck by the — even then — 100 per cent observance of blackouts, rigorously enforced by youth volunteers and police. By night, even then, searchlights played in the sky hunting for aircraft. Guns fired. "Wounded" were carried to first-aid stations.

Those who have watched the Japanese taking suffering and death as normal experience know that when the time comes there will be an imperceptible shift from the pretended to the real. That has been true of other lands. Japan's fatalism, worship of the heroic, spirit of self-sacrifice and glory in dying for the native land, combine to assure that air-bombing will hardly do any immediate job of wrecking the people's morale — whatever it may do to homes, factories and shipyards.

The livelihood of city dwellers can be interfered with by bombing in Japan as elsewhere, of course. Food must come in from the country, but it need not be varied or lavish. Boiled rice, pickles, seaweed and any fruit in season keep things going. This can be transported by pole-bearer and handcart, if motor transport and railways break down. For service of this sort, war difficulties and hazards will only increase the number of volunteers in such a country as Japan. In times of emergencies boy and girl scouts, in Japan as in China, have taken on adult duties. During several accidental air-bombings of the International Settlement and French Concession of Shanghai during three months of nearby hostilities in 1937 I took many photos within a few seconds of the time the blasts went off, and uniformed Chinese children are in evidence in every picture, giving help even ahead of the arrival of police and ambulance squads. My belief is that in comparable situations the Japanese boys and girls will do the same, with even better discipline and coordination because of rigorous official supervision conducted for years past.

JAPAN'S industrial sections have long been a special subject of consideration in connection with potential air-raids.

Secrecy has been the rule in Japan to an incredible degree in connection with almost every sort of industrial enterprise. This has been particularly true since around 1931, but it started years earlier and sometimes resulted in ludicrous situations. American and other experts were taken to Japan to conduct certain operations only to find themselves hardly able to get into the factories where they were to work. They never were permitted to stray from their immediate tasks, and once their usefulness had been expended — mostly in teaching Japanese associates — they were whisked away. American airplane technicians went out of Japan angry because super-cautious hosts had let them assemble and instruct, but never fly.

Especially after 1937, official statistics on manufacturing and similar subjects dried up to almost nothing. A Japanese employed by the American consulate in Formosa was actually arrested because he tried

Americans landing in New Britain as Liberator squadrons bombed the Jap positions.

European Photo

Press Association

Liberator over Jap airfield, Marshall Islands.

to get routine annual figures on the number of motorcars on the island; in a lengthy battle for his release it was the American authorities who finally weakened. Visiting correspondents who asked for production and trade statistics began to be treated as spies; after Pearl Harbor virtually the whole Allied press contingent was put in jail (not internment) and interrogated on the theory that they were intelligence operatives for their governments — as indeed was the case with Japanese newspapermen abroad.

Most of what was known publicly on such points as ship and plane manufacture turned out to be wrong, and there is reason to believe that the Japanese skilfully helped spread stories of how stupidly they copied the inventions of others, so poorly that the planes crashed, merchant ships turned over and battleships came apart from the firing of their own guns. It was a technique used even before the Russo-Japanese war, when the Russians were shown not Japan's best troops, but her worst, expressly to mislead all the Russian Generals.

Liberators heading toward Paramushiru Island.

Acme

Construction in Japan's industrial districts is not of wood and paper but of brick, stone and metal. Not only are buildings fire-proofed. They too are made shock-proof, due to the double expected perils of earthquakes and bombings.

Japan does have her industrial establishments pretty closely concentrated, despite some efforts to spread into such territory as northern Hokkaido and Manchuria. The main industries center in four areas, reading on the map from east to west: Tokyo-Yokohama, Osaka-Kobe, Nagoya, and northern Kyushu Island. The group from Osaka to Kyushu is a bare 400-mile stretch overall, not much over an hour's bomber flight.

But there is no ignorance about this on the part of the Japanese, and they have taken such steps as they can to improve the bad points of their position. This territory is still extremely hard to get at, far removed from any bombing bases we yet have. And the bare statement of facts is deceptive.

Not all of Japan's war industry is in factories. Much decentralization of war work has been effected, and a great deal of it is done in individual households. These in turn could scatter still more, in time of a need not yet developed. The example of other Oriental countries under bombing, as demonstrated in such cities as Chungking, Calcutta and Colombo, shows that it takes only a few hours, in time of urgent necessity, to spread whole urban populations among relatives and friends in the hinterland.

There are of course some big cities. Tokyo has a peacetime total of more than 6,700,000 people, Osaka has over 3,200,000, and the empire as a whole, including Korea, is about the size of Texas, packed with seventeen times Texas's population.

But nobody outside Japan knows how many remain in the cities today. What we do know is that a good while back the authorities ordered everyone out of the cities except essential war workers. To prepare for the day of invasion, Japan is now rumored among the Chinese to plan removing her capital and Emperor from Tokyo to Hsinking, capital of Japan's puppet state of Manchuria.

Often ignored are certain handicaps under which our attacking aircraft must operate when they go against Japan. The splendid mission of Doolittle and his comrades launched from carriers, was technically a stunt — doubtless not the sort of thing we shall use as routine. For steady attack, land bases are needed. So far, we remain out of land range of Japan's four main islands.

After we get near-by land bases, we shall find the Japanese still protected by their weather. The whole Japanese island group is subject to fog, rain, sudden cold fronts. All sorts of odd meteorological conditions there plague even peacetime transport fliers fearfully. They are bound, with the best of luck on our part, to take constant toll of attacking planes unprotected by navigation guides. Crashes against mountains are frequent in normal operations of the Japanese themselves, aided though they are by ground observers and radio reports.

Now the newly-extended Japanese empire provides us with many targets outside the main island group. In fact, most of our targets up to the present have been places

Liberator bombing Kairiru I. in New G

few Americans ever heard of before. It does not appear that this new "Asia for the Asiatics" has any tremendous industrial concentration, though there are some few points where some industry is present and no doubt relatively vulnerable.

Hokkaido has been mentioned. Mukden in Manchuria has a certain concentration of new industries. Along the China coast there is something at Tientsin, more at Tsingtao, most at Shanghai, and probably a bit here and there up the Yangtze at such places as Hankow. Hongkong and Canton have also been put to work, though their native populations seem unable to find enough industrial or other employment to keep

being in a semi-starving condition and the cities have half-emptied. Use is made of Manila, Hanoi, Singapore, Batavia. There are no doubt important naval targets at Singapore, Manila and Hongkong. But we are still out of bomber range of most of these, and as yet within effective continuous bomber range of none.

The places just mentioned as possible targets are actually of prime importance to Japan. For Japan's extensions have done a great deal to conquer her need for raw materials.

Take for example her holdings in Indo-China, with its 25 million population, including a good many fighting men formerly mercenaries under the French. This area has coal, iron, rubber, tin, lead, zinc, rice, cattle, hides. Thailand has tungsten, antimony, manganese, iron, coal, tin, silver, quicksilver. Malaya has rubber, sugar, pepper, tin. Burma has oil, tin, teakwood, silver. The Netherlands East Indies have a world monopoly of quinine bark, one-third of the world's rubber, also tin, oil, sugar, tobacco. The Philippines are rich in both mineral and agricultural products which the Japanese can exploit as we did not, gaining iron, silver, lead, zinc, copper, petroleum, asbestos, manganese, copra, rice, sugar, tobacco, and a world monopoly of Manila hemp.

Mere bombings of those vast areas will hardly serve us. We must either take them away by actual capture, or sink Japan's ships in such quantities that she is isolated from them. For the present, much of our vital strategy centers around ship sinkings. By March of this year, it could be estimated that some 70,000 Jap soldiers, stationed in isolated island bases, were starving to death. This is one measurable result of Japanese ship losses that we estimate at a total of 1358 since December, 1941. We cannot estimate replacements, but we have evidence of Japan's steel shortage in the fact that she is falling back on the use of wooden ships for her communications — even sailing vessels. Our own Navy and Air Forces are thus having visible success in cutting the Jap links of empire. In March of 1944 General Chennault could say:

"The sea routes between the Japanese islands and the Japanese Empire are the jugular of the Japanese military system. We have stabbed tirelessly for the jugular. Among the great air forces of the United States, the Fourteenth is still small. But since March 1943 we of the Fourteenth Air Force have certainly sunk 274,939 tons of enemy shipping, and probably sunk or damaged another 282,350 tons."

We are now managing to strengthen General Chennault; a Japanese broadcast in March announced he had 400 planes. Meanwhile our Seventh Air Force in the Central Pacific — a theatre of over 16,000,000 square miles — is reducing the island bases we need as stepping stones to the Asiatic Continent for our Tokyo approach.

STILL, despite all this progress, those of us who know our Japanese would not expect them to be downhearted. Japanese fortitude has not been exaggerated. During those dreadful Tokyo days and nights of the 1923 earthquake I saw tears shed but once — and that not by a Japanese, but by an American who had seen his wife, pinned by a fallen building, burned alive.

The "Eddoko," or native residents of Tokyo, moved quietly and purposefully both during the catastrophe, and in the following clearing and reconstruction which began before embers had cooled. In China the Japanese troops were never seriously air-bombed; but for many days after the beginning of the Shanghai hostilities on Aug. 13, 1937, the flagship Idzumo was repeatedly a target for attack by Chinese pilots flying American planes — and the Idzumo remained throughout either tied to the consular wharf, or moored a few yards away in the middle of the Whangpoo River.

This may have expressed merely a contempt for Chinese aerial marksmanship of the period, yet it made a great impression on the international community which observed it firsthand.

During the period since Pearl Harbor, Tokyo leaders have made it rather a special point to warn the people that they must expect Allied air-raids in due time. This is in the tradition of Japanese psychology, which draws strength from expectation of the worst and a stiffening of the national family strength to meet it. Our radio commentators have chosen to read incipient panic in Japan's frequent official warnings about air-raids. The Japanese don't think in such fashion.

They see us preparing to bomb them — but they can think of England. Germany, with bases just across the channel, could not reduce England to submission by bombing despite all her advantages of supply. Nor did Germany get troops across the Strait of Dover, a mere 22 miles. Japan's own Strait of Dover — the Strait of Tsushima, which separates Japan from Korea — is five times as wide. Add to this the fact that we have yet to take the bases on the Chinese coast we shall require — and the further obvious difficulty we shall have in supplying such bases with the huge quantities of materiel that great air missions demand — and you see some of the grounds for Japanese confidence.

We can eventually beat Japan. But we are still many miles away from her in the Pacific, we have not yet made contact with the bulk of her armies or her navy, and the battles to date are only preliminary sparring. Our real war with her is just about to begin.

Press Association

Liberator over Jap-held Nauru, Marshall Is.

Liberator mission over Salamaua, New Guinea.

Acme

General Hale, Commanding General of the U. S. Army Seventh Air Force, authorized this manuscript in March to serve as "background information."

Because it is such a forthright statement of facts vital to every American, permission was sought to publish the major portion of it as an explanation of what we are driving toward in one of the greatest theaters of the World War. Says the General: "The Mitchell-Liberator combination is proving itself beyond our greatest expectations."

Official Photo U. S. A.

AIR LEAPS TOWARD Tokio

TRANSCRIBED FROM AN INTERVIEW WITH MAJ. GEN. WILLIS H. HALE

MANY people in the United States have virtually no conception either of its watery vastness or of air fighting conditions in the Central Pacific. The mission of the Seventh Air Force, present and future, involves land based air operations in a theater which extends over some 16,000,000 square miles, or more than five times the size of the United States.

The imminent threat of invasion of the Hawaiian Islands was not lifted until the Battle of Midway. Then we required bases from which to operate. These were gradually built up 2,000 to 2,400 miles from Oahu in the Phoenix and nearby islands and later in the Ellice Group.

These distances are important. Any understanding of the war in the Pacific must be based on an appreciation of distance.

The climate is wonderful in much of this theater, but the weather is awful. It is rapidly changing and treacherous. Dependable forecasts are rarely available to the air crews of the Seventh Air Force. In operations against the Marshalls, for example, Seventh Air Force fliers were faced with a "moving front" which sometimes reached an altitude too high to fly over and which often forced the pilots to fly, in a driving storm, a few feet above the water.

Having occupied the Marshalls for more than twenty years, the Japs were fully cognizant of these conditions. Experienced Japanese pilots believe it the most difficult theater of war in which to maintain sustained air combat. This was possibly a major reason why they have not sent so many replacement planes into this area as they poured, despite their continuing heavy losses, into the New Britain-New Guinea sector. There was no use sending very large numbers into the Central Pacific where often their pilots couldn't fly them.

One of our objectives of the air war in the Pacific is to secure a chain of bases which will put the Japanese homeland within effective range of our heavy bombers. The Marshalls operation was a long step in carrying out that plan. It was not sufficient to render the Marshall Islands useless to the Japanese. They were needed by our forces for air bases, hence had to be occupied.

The Seventh Air Force was well on its way to accomplish the "neutralization" of the five principal Jap bases in the Marshalls as early as two weeks before the occupation. (By neutralization is meant denying the enemy his intended use of a given base.

The Seventh Air Force, by its day and night bombing of all major Japanese installations in the Marshalls — with Liberators, Mitchells, Dauntless, P-40 Warhawks, everything we had with wings on it which could carry a bomb — helped largely in rendering impotent the ground defense installations which the Japs had developed and on which they had confidently counted to defend those islands successfully.

In the Marshalls campaign from 80 per cent to 92 per cent, depending on the

General Hale inscribes a 1000-pound Liberator bomb: "From Nimitz to Hale to Tojo."

of plane involved, of all bombs dropped by the Seventh Air Force *hit the target at which they were aimed.* This record is as great a tribute to the excellence of the Norden bombsight as it is to the skill of Seventh Air Force air crews. We use the Norden bombsight exclusively in our heavy bombers.

As a medium and heavy bomber team the Mitchell-Liberator combination is proving itself beyond our greatest expectations practically every day in the Pacific. The planes fly shot up, through weather so turbulent it threatens to pull them apart. Almost never do they have fighter protection; the distances are too great. Frequently they must fight their way into and out from a target. Sometimes they get blasted full of holes; sometimes they get motors shot out. But just about always, if the wings stay on, they get home. The men and women who are building those airplanes deserve great credit.

The Marshall campaign has provided the Japs with a handwriting on the wall — not a handwriting in the sky — which must be legible to all of them. The pattern for the future, at least so far as the Air Force is concerned, will be to render ineffectual every island group which stands between us and the Japanese homeland. The Seventh Air Force has already been blasting at the Carolines. Anyone who wants to know where it is going from there need only look at the map.

These operations are largely concerned with securing air bases. But they are in no sense "island hopping"—a term used largely to indicate a tortuously slow approach to Japan. Through combined operations with the Navy and the Marines, we are advancing by leaps and bounds.

The Seventh Air Force commenced its bombing of the Gilberts on November 13 from bases roughly 4,000 miles from Tokyo. About 85 days later we were set in the Marshalls and our bases there are about 2,500 miles from Tokyo. Thus was gained 1,500 miles, an average of more than 17 miles a day.

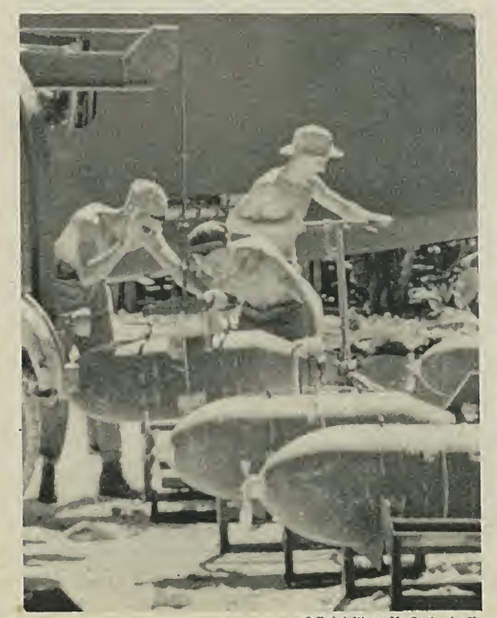
The men who fight the air war over the Pacific carry on as tough a battle as is being waged anywhere in the world. They sleep on canvas cots in tents and under mosquito netting. Their showers are gasoline drums with a nozzle, and they wash and brush their teeth and shave in tin hats. They are 2,400 miles from the nearest American community, the nearest dance, the nearest normal social life.

If they are shot down or disabled over the target they face what to them is the stark horror of capture. If they go down in the ocean their chances of rescue, despite the vigilant Navy rescue service, are problematical. Yet they must fly constantly. During some months every bomber in the Seventh Air Force forward echelon has averaged six missions. Considering the distance traveled, that is, in my opinion, more flying per airplane than in any other theater in the war.

Because of conditions, the Seventh Air Force has had to become a versatile Air Force. Bombers are used occasionally as fighters, and fighters are regularly used as bombers. Heavy bombers of the Seventh Air Force constantly have to land and take off from strips which any rule book will say are impossibly short for a B-24.

For ferrying fighters over long distances, the Seventh has developed a convoy system in which the fighters fly formation on a B-24 which does the navigating — a hazardous undertaking, but necessary because of weather. The Seventh has developed its own transition training schools, in which every air crew member must take a post graduate course before he is qualified to fly in the Central Pacific.

THE Seventh Air Force is operating bombing missions longer than those in any other theater. The longest was 2,769 miles, the average is more than four times the distance from London to Berlin. All flights cover great water distances with no intermediate landmarks. The usual checkpoints such as rivers, mountains and railroads, are non-existent.



Official Photo U. S. A. A. F.

"Bombing up" one of General Hale's Liberators.

The navigation must be perfect. Targets are pin points on islands which themselves may be smaller than the factory area of some prime targets in Germany. It isn't enough that bombers hit the islands; they must hit the target. Seventh Air Force bombardiers must be able to get hits from an altitude of 12,000 feet, an average of less than 250 feet from the center of the aiming point. This is doubtless the most consistently accurate bombing being done anywhere in the world.

In a mission over Rongelap, Liberator bombers were assigned the job of knocking out a radio station in a building only 35′ x 125′. The ships went in at 3,500 feet, made a perfect run and dropped their bombs squarely in the middle of the building. They use 100-pound bombs, relying on accuracy, not on tremendous concussion.

One of the most important lessons of the Marshalls campaign has been the proved facility with which the land-based aircraft of an Army Air Force can support, and cooperate with, the Navy and amphibious forces. The value of strategic bombing in the Central Pacific was demonstrated in the Marshalls. In the march across the Pacific, land-based airpower will have the dual function, proved in the Marshalls, of neutralizing the enemy air forces and preparing Jap-held islands so that they can be more successfully attacked by Navy surface vessels and carrier-borne aircraft, then stormed by infantry with a minimum of casualties.

The Marshalls campaign, under the brilliant and meticulous leadership of Admiral Nimitz, has conclusively demonstrated that properly employed heavy land-based aircraft are a vital factor in operations ahead. This campaign also revealed outstanding evidence of the unexcelled training and equipment of our Army Ground Forces in amphibious assault operations, along with our incomparable Marines. These, coupled with the unveiling of the devastating power of the guns of our expanded Navy, constitute the first really terrifying threat Japan has ever known.

Christening of a Liberator by WACS in Great Britain.

No Milk Run

Arch Whitehouse, who has been writing air-adventure stories for years, believes he is the only accredited war correspondent with "wings up" and actual combat experience. In 1943 he was in Newfoundland, flying with the RAF on Catalinas; *Coronet* published some of his adventures there. Here he reports on a session with some Liberator pilots in Britain.

I WAS ordered to write this. The order came direct from several dozen Liberator men in Britain. War correspondents are asked many strange favors, but this was a command.

The boys of the Eighth Air Force seldom see a war correspondent in the flesh. The W-Cs, generally speaking, are not legion; there are all too few to go around. That's a mighty big air force we have over there now, and once the lads get their hooks into a correspondent, they practically take him captive.

I was at my first Liberator field exactly ten days. I went with the express idea of staying about three. I might have been there yet, only I sneaked out while most of the boys were bombing Bremen.

You see, those boys have so many ways of telling you that Liberators are the best damn bombers in the E.T.O. (European Theatre of Operations) that a three-day stay is nowhere long enough to hear their tales.

In the end they had me carrying the torch, too, which is what I mean when I say I was ordered to write this.

I'll never forget the night I dropped my baggage and typewriter in the alleged Officers' Club of the first Liberator group I visited. You'd get a laugh out of that Officers' Club gag. This one was an old World War I Besseneau hut, complete with mud, crap game table, two asthmatic fireplaces and some wicker furniture about ready for a treatment at Hot Springs. There was also some mud, drooling in under the doors. I have experienced what they blithely term "mud season" in New England, but the Old England version can give them seven holes and beat them in eighteen.

Their pin-up girls are called "Lousy Liza", "Betty the Bitch", "Louisiana Lulu-aby", "The Missouri Mauler" and "Dizzy Dora" . . . and they're all Liberators.

I was introduced to the mob by Captain Bill McShane, the officiating Press Relations Officer. To put everyone at their ease he explained solemnly that I wrote touching features for *Smoke House Stories*. From then on I was practically accepted. My formal initiation still hung in the balance however. I had to drink a full quart mug

...t brown ale down within just 60 seconds. Failure provides a penalty of paying for a round of drinks.

Did *you* ever try to drink a quart of beer in 60 seconds?

"Did you ever hear of the Ploesti raid?" one of the boys opened up on me.

"Of course. What about it?"

"Well, when you write home, you tell 'em *we* did that — on Liberators. We flew Liberators, Mister!"

I JOTTED it down just to satisfy the lad. I didn't tell him I knew all about Ploesti before I started and that I'd begged Major Jack Koefod, Press Relations officer back in London, to send me to this particular field. Jack's the famous sports writer of pre-war days; he had tipped me off about this bunch. The story of that mission had made me want to meet some of the boys who had been on it.

But they didn't tell me about Ploesti — they told me all about the Liberator.

"We got a great ship," someone bellowed at me. "You talk about coming home on two engines. These babies will come home if you just hold the fuel consumption record up against the instrument panel!"

I was beginning to get the idea, anyhow. Anything the Liberator takes on automatically becomes a milk run, to hear these guys tell it.

"Listen," another Lib-lover said, taking an extra hitch in my ear. "We flew these babies all across the United States and hopped 'em across the Atlantic. Just like that! Then when we were getting set over here in Britain, turning the whole bombing schedule into a picnic, some guy ups and says: 'Oh, so you birds are hot pilots, eh? You really want something to get your teeth into? Okay! Pack your B-bags and shorts and skip down to North Africa. There's a job or two to be curried down there!' So we drop everything here, take some of the ground crew with us and we go to North Africa . . . Just like that!

"You heard about Sicily and Italy, didn't you, Mister? You heard how we softened all that up for them, just flying across the Mediterranean and smacking Salerno about, didn't you? Well then, just for good measure we knock off Ploesti for them. We did all that with Liberators, Mister."

I'm not telling you — they were telling me!

"So!" my pauciloquent friend goes on, "we fix everything for them in North Africa and then things begin to get rugged for the bomber boys back here, so back to England we fly, and here we are . . . still flying Liberators and now they're talking about an invasion! I don't suppose the Lib would have anything to do with that, do you?"

"I don't have to drink another quart of beer right off, if I don't give the right answer, do I?"

"Just you tell 'em back home that we fly Liberators, Mister!"

Bill McShane rescued me and explained: "Don't get mad at these kids. They mean well, but they're sore because the Liberator isn't getting the credit they think it deserves.

"They don't want credit for themselves. They're just trying to tell you they fly a swell ship."

"I'm just trying to be a good Joe," I pleaded.

"Sure! You're doing all right. Just take it easy and listen. They've never seen a war correspondent before."

"That makes it even. I've never run into a pack of Liberator Loons before. I hope you'll write my folks back home and tell them I went down fighting."

"What rank do you hold — as a war correspondent?" Bill asked.

"None! But I'll automatically become a Captain if I'm taken prisoner," I explained. "Nice, eh?"

"Don't worry about it. These guys will make you a General if you write just one story about their Liberator."

"Do I have to drink a . . ."

"Forget it!"

Somehow we got a meal, but my baggage had disappeared. Later, I discovered it had been taken over to one of the nearby billets, my bed had been made up and my gear laid out. I was doing all right, having a pack of officers for my batmen.

At dinner I sat at a table with a gang of Lieut. Colonels and Majors. They all had enough decorations up — and I mean decorations, not just campaign ribbons — to start an epic in Technicolor. I asked Major Kent Cooper about his first string.

The Major was still fuming about a line the *Stars and Stripes* had carried about him that day. Something about being the most fearless pilot in the Eighth Air Force. The boys don't like to be singled out for such plugs. He had been in the Royal Canadian Air Force and he'd seen plenty long before Pearl Harbor, but he just told me about the Liberator. McShane added to it by saying that Cooper spent his leaves, flying about the country trying out everybody else's bombers, and he still liked Liberators!

Major Paul Burton, another much-decorated guy who speaks in the hallowed tones of a choir-master, *almost* told me about his mob; affectionately known as Burton's Iron Raiders. But the yarn petered out to another detailed lecture on the marvelous features of the Liberator. Burton and his Iron Raiders have flown over thirty-five different countries during their tour

Berlin Express, a U. S. Navy Consolidated Liberator assigned to anti-submarine patrol over the Bay of Biscay, takes a load of "petrol", as the RAF calls it, before taking off on its mission.

Official Photo U. S. Navy

of operations — and every mile has been flown in Liberators. Knowing the censor, I won't list the countries involved. The actual list would make you whistle in high-C.

Back in the so-called club I was introduced to Captain John B. MacCormack, another Liberator Loon from Syracuse. Captain Mac, as they all called him, recognized my name at once and said he had read every story I had ever written. When I told him I felt sorry for him, he argued that I was responsible for his being in the Air Force. He had read so many of my stories about the old time war aces that when this picnic came along, he was one of the first to join up.

FOR the rest of the next hour or so I was Captain Mac's particular guest and he induced me to agree to go along with him the next day. That is, I would have gone, only Bill McShane talked me out of it.

"Look," he pleaded. "Just because they are flying Liberators, don't think all these missions are milk runs. You stay home here. You can get up early, have breakfast with them and see them briefed, but quit trying to regain your youth. They have enough to worry about up there, without taking a passenger along."

Bill was right, so I called it off. And it was just as well, because it turned out to be no milk run.

I felt sick about Captain Mac, because he had said I was responsible for his being in the Air Service. Two nights later in the Red Cross club a young gunner came up to me with bewilderment in his eyes.

"Didn't you go with Captain Mac on *The Vagabond King,* the other day?" he asked in a dry voice.

"No. I was talked out of it," I explained.

"Your name was up on the board," he persisted.

"I know, but I just didn't go," I said.

"Too bad," he answered, and then smiled. "I mean, it was too bad you didn't. He'd have come back, if you had."

"I don't get it."

"Didn't you know? Captain Mac was a squadron leader, but he never led the squadron. He always sent his sub-leader up front and he flew the Purple Heart corner — to protect the others. That's how he got it."

"But where do I come in?" I asked.

SHOP JARGON

Coffee pots, alarm clocks, bathtubs and banana peels —

That's what airplanes are made of — if you go by aircraft shop terminology.

At Vultee Field, employees don't try to memorize the myriad sets of numbers given to parts.

Ask them where 74-77003-400 is and you draw a blank look. Say in shop jargon that you're looking for a "coffee pot," and they spark. The part in question, a heater for the pilot's cockpit, actually does look like a coffee pot. It's cylindrical, has a nozzle, even a handle. You can almost pick it up and start pouring. See the picture. It's really a heater to be attached to the plane exhaust.

Other parts have been similarly nicknamed for the sake of convenience. The alarm clock, which is a gear box, is a dead ringer for its namesake, right down to the flat base it sits on. The bird cage, a fitting that goes into the tail assembly, brings to mind the gambling device from which it takes its name. So with the flutes, which are seat support tubes, and spaghetti, formed electrical conduits that, when piled into boxes, take on the resemblance of the Italian dish.

There's a lot of others — horsecollars and slingshots and hayhooks and violin pegs; butterflies, elbows, stars, fingers, and half-moons.

Most of the names originate with the operator who first makes the part in the machine shop or Sheet Metal department. From there they spread through the stock rooms and out to the boys on the final assembly line.

Looking for a rabbit ear? You'll find one on an airplane as easily as you'll find one in a hutch.

"Don't you see? If you had gone along, he would have played safe and flown up front. Someone else would have got it instead. Mac would have come back," he said half-accusingly.

"I'm sorry," I answered. There was nothing else left to say.

"Oh, don't worry about it too much," the young gunner said. "He was flying a Liberator, remember, and I wouldn't bet he isn't safe. I was his gunner . . . tail gunner, and what Captain Mac can't do with a Liberator no one can do. Maybe, if I hadn't been in it wouldn't have happened, either."

"Let's have a cup of coffee," I suggested, "and you can tell me about it."

But again, it all rumbled off into another song and dance about the Liberator and how ten to one Captain Mac would have got her down okay.

"I heard he had two engines shot out," my gunner pal explained, "but that's nothing with a Liberator. I'll bet Mac got her down safe somewhere. Did anyone ever tell you what he did at Salerno?"

I dreaded it, but I let him go on.

"Well, we were doing a bombing show around Naples, but Captain Mac stayed around too long and we had to land in Italy. We didn't have enough gas to get back across the Mediterranean, you see."

"I can hardly believe that," I taunted. "Don't any of you guys carry a cigarette lighter?"

"Well," he went on ignoring my emergency suggestion, "we got down all right, but we got plenty of stuff from the ground before we landed, and we knew we had to none too far from the war."

"I know," I broke in again. "You just took the wings off, taxied up the nearest road and went into action as a tank."

"Well, not exactly," he said apologetically, "but Captain Mac took a couple of the guns off and he went off up the line looking for Eyeties. We were missing for several days and did we get hell for that!"

Knowing Mac I could believe that. Too many Whitehouse thrillers at too early an age.

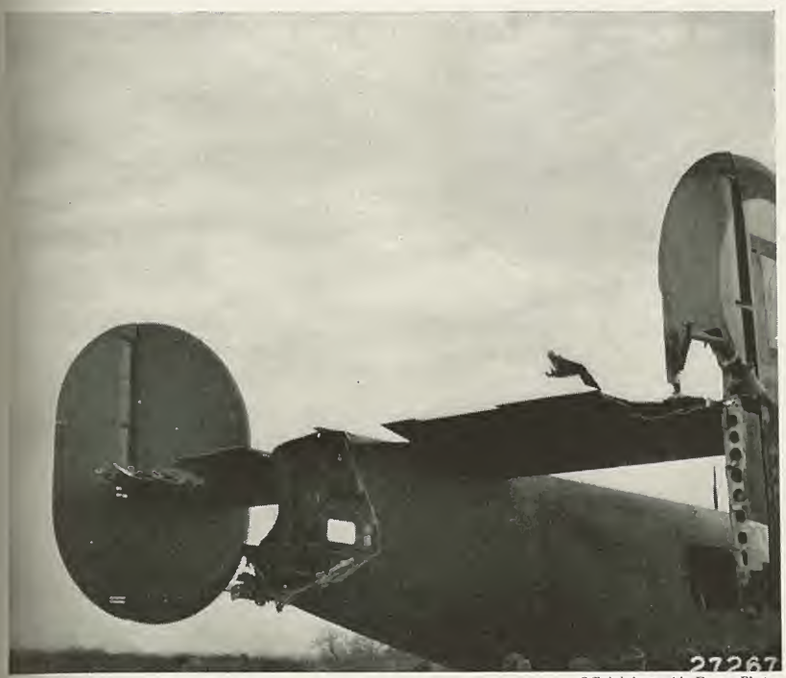
"Well, he's had it now," the gunner reflected, "but no guy can kick getting in a Liberator. There's a war on over here and if I have to fight in it, I'll take my chance on a Lib."

There's no argument about it. They're crazy about that plane.

Why Liberators come back

[Extract from the report of Major General Willis H. Hale, Commanding General, U. S. Army Seventh Air Force.]

The planes fly shot up, through weather so turbulent it threatens to pull them apart. Almost never do they have fighter protection; the distances (in the Pacific) are too great. Frequently they must fight their way into and out of a target. Sometimes they get blasted full of holes; sometimes they get motors shot out. But just about always, if the wings stay on, they get home. The men and women who are building those airplanes deserve great credit.



Official Army Air Forces Photo

Official Army Air Forces Photo

CONSOLIDATED VULTEE AIRCRAFT CORPORATION

San Diego, Calif.	Tucson, Ariz.	New Orleans, La.	Louisville, Ky.	Dearborn, Mich.	Elizabeth City, N. C.
Vultee Field, Calif.	Fort Worth, Texas	Nashville, Tenn.	Wayne, Mich.	Allentown, Pa.	Miami, Fla.

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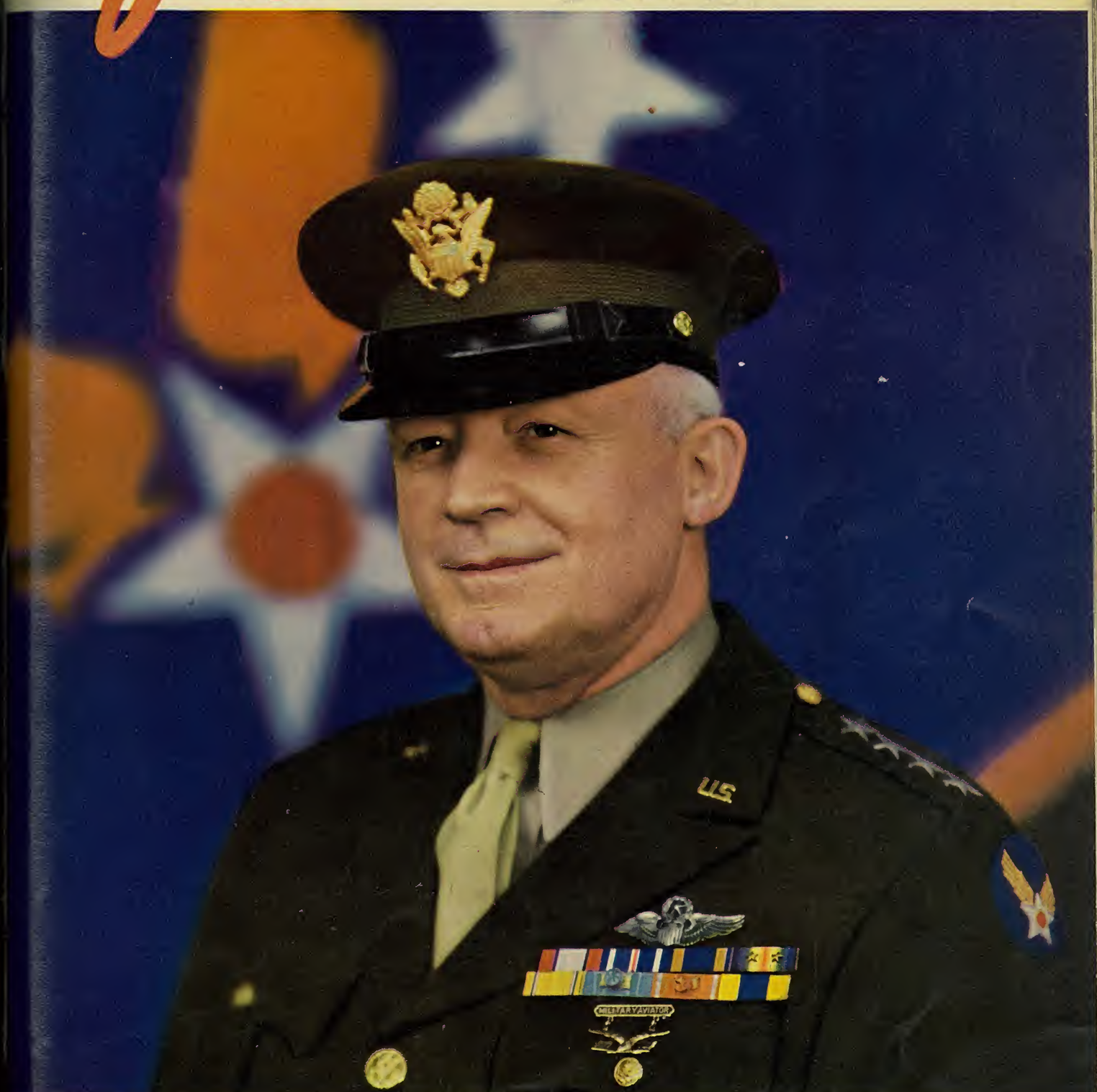
Here you see Wake Island flaming in the opalescent sea that laps its Pacific coral reefs—an official U. S. Navy photograph of our bombing of Jap installations there. Liberators as well as carrier-borne planes have assaulted Wake frequently in 1944. Navy photographers are using Kodacolor film to make a permanent historical record of such operations.

Plane Talk

JULY · 1944



...eral Henry H. Arnold, Commanding General, A.A.F

Purple Heart Corner • Guest of ATC • Fire-Ball to India
Evacuating Wounded by Air • Putting Veterans in Jobs

Plane Talk

If you wish to share your copy of Plane Talk when you are through reading it, you may send it to a friend for 6¢. The simplest way of mailing is to slit a business-size envelope at both ends, roll up the magazine in it, seal and address and put on 6¢ in stamps.

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With the Editors

The newsmen of this war are doing a heroic job in keeping the American public informed; they do much of their work under fire as a matter of course, and more than a score of them have been killed in the line of duty. Above you see Charles Corte, Acme News reporter and photographer, who writes (on Page 9) a report on the men who have led America's invasion of Europe — our airmen. Corte, who was awarded the Purple Heart by Lieutenant General Jacob L. Devers, at the request of General Eisenhower, was one of the first newsmen to go overseas with the AEF. Wounded at Kasserine Pass in Tunisia, he was overseas for more than two years, and is now invalided home for treatment. He is 31, has been an Acme photographer for 12 years, was married in June of this year.

Addendum

In suggesting a checkerboard system of airstrips in our May issue, William A. Mara wrote that each minute of latitude and longitude represents an average of *ten miles. A better word would have been* approximately. *While a minute of latitude is rather closely equal to a nautical mile anywhere on earth, the minute of longitude is equal to a nautical mile only at the equator, becomes less in proportion to the cosine of the latitude.*

Our July Cover

General Henry H. Arnold, Commanding General of the Army Air Forces, is pictured here in a reproduction of an official AAF kodachrome. General Arnold, who is the first American airman to achieve the rank of General, is one of the nation's first military pilots. Graduated from the U. S. Military Academy in 1907, he completed flying instruction at Dayton in 1911. He serves on the Combined Chiefs of Staff and the Joint Chiefs of Staff. To his acumen, foresight and skill America owes a great debt for the outstanding air power it possesses today.

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At right, native at an air base at Aden tests the wind with balloon.

FIRE-BALL TO INDIA

By Fred B. Barton *(By Mail from Assam)*

Above, a Liberator Express on the Fire-Ball route making a scheduled stopover at Ascension Island, a speck in the Atlantic half-way between Natal in Brazil and the west coast of Africa. The pictures used here are INS photos, a part of the series taken for *Life* in the 8-day round trip made by Tom McAvoy, whom our author met en route.

SOME day — a hundred years from now, perhaps — it will all seem dull and commonplace. But at the moment the airline called the "Fire-Ball" seems the most exciting news in the world.

Look you. Pilot Jimmy Levert and his crew had supper on a Sunday night in Miami, Florida, and took off from there in a Liberator Express. That same plane with its cargo landed in Assam, India — 14,000 miles away — on Thursday before supper. That same evening the plane, emptied of its war cargo and re-loaded with soldiers' mail, took off from Assam. The following Monday it landed back in Miami, ready for a fresh load.

The whole thing seemed so incredible that *Life* magazine sent a photographer named McAvoy to make an 8-day round trip with the plane and prove it really happened. I met McAvoy over here in India. He was still wiping supper crumbs off his chin when they hurried him back on the plane — and despite the briefness of his stop they held the plane 45 minutes for him. If he was Hump-happy from too much airplane riding by the time he got home, anyone could understand.

They don't punish the crews that way, because no human being could keep awake for eight days and eight nights and fly a plane across the trackless oceans and deserts. It's hard enough even for a passenger; he at least can sleep. The Army's Air Transport Command Ferrying Division aims for safety for the crew as well as speed for the cargo.

So the Fire-Ball operates on the system of a relay team. Each crew brings its cargo ship into a spot and turns it over to the crew waiting there, then waits for the next plane — which it flies on one more leg of the journey. Thus each crew flies maybe 14 or 16 hours, delivers the plane to men waiting for it, and devotes a few days or possibly a week to piling up sack-time —

storing up sleep — before grabbing the next plane.

The men who make up the crews come from all over the American map. Maybe you'd like to meet a typical crew that I found at an unidentifiable air base in Northern India. Their camp is just this side of the Hump — that gap in the Himalayas across which our Army has undertaken to fly war supplies into China. It is a camp of mud surrounded by tea-gardens or plantations — called tea-paddies. Around you are Indian coolies. You are 10,000 years from home. Yet miraculously you get airmail from the States in from 5 to 15 days.

Captain and pilot is Jimmy B. Levert, 30 and married, of New Orleans. Levert is short (5 feet 6), compact, incisive. He grew up with his own charter airline service at New Orleans, graduated to National Air-Lines, went on to Pan-American's ferry service. From there to the Army was an easy step. As captain of this ship he is in complete charge, almost as much so as a captain of a sea vessel. He could almost conduct funerals and perform marriages, though he doesn't specialize in that.

Co-pilot is Lieutenant Phillip Sweet, 21 and single, of Kansas City, Missouri — a buoyant guy, youthful and unafraid. He was going to medical school at Kansas City Junior College, then left to work awhile for Martin at Baltimore, Maryland. That, too, made an easy step into the Air Forces.

Navigator is Lieutenant Bob Cochrane, 29 and married, of Cornelius, Oregon. Cochrane has keen eyes, wavy hair, a sober face that belies a quick, dry humor. He was a public school teacher in Oregon until the Army got him.

Crew chief or engineer is Master Sergeant Harold B. Fleming, 24 and married, of Dallas. Fleming is a 200-pounder, square-jawed and 6 feet 3. He would rather sleep than eat, so he and Phil Sweet rarely get up in time for breakfast. In civilian life he worked for the Texas Company and also for a private oil firm at Wichita Falls, Texas.

Radio operator is Technical Sergeant Reginald L. Thompson, 37 and single, of Jamestown, North Dakota. Thompson is slender, hard-working and a student. He keeps his ears plastered to the earphones while the plane is in the air, because that slight contact with the ground is the crew's best hope of safety.

Over in India this crew reports to Captain Walter F. Woodruff, 28 and married, of South San Antonio, Texas. Captain Woodruff, who is a 190-pound Texas product — and proud of it — has the title of chief pilot of the Fire-Ball airline in India. He used to work in the electric furnace department of a steel company in his home city.

The Liberator Express stops at Georgetown, British Guiana, where a relief crew comes aboard.

THESE men don't discuss the routes they travel, the cargoes they carry, or essential details as to time between stops. Few men in our Army of ten million have the subject of Security so painstakingly drummed into them. Every day of their lives is lived in secrecy. And yet there are some things the censor permits to be said.

The Fire-Ball line has been running for six months. All the planes on this line are C-87 Liberator Express planes. A competition line flies C-54s from Wilmington to a second spot in India. That outfit is called the "Crescent Line." Fire-Balls call the Crescent pilots "glamor boys," because they wear neckties and because they fly planes with reclining seats in them. It is a natural rivalry and a wholesome one.

Both Fire-Ball and Crescent publish small mimeographed papers giving chit-chat and occasionally some really important news.

A recent joke in the paper mentioned a customer who complained because, if he got off the plane to buy a sandwich, he missed the plane. "Sorry," observed the editor dryly, "but this can't be corrected. In the future we won't stop long enough for the passengers to get off."

This is an airline where passengers are not perhaps unwelcome, but they take second place (except in the case of relief pilots) after the war-needed freight: repair parts, new aircraft motors, medical goods and mail.

One gallon of gas carries one pound of cargo 8,000 miles in the Fire-Ball.

Some of the planes stop at Ascension Island, the spot so lonely that Napoleon had to be removed from there. Pilots will tell you it is still lonely.

Often a Fire-Ball crew handles several different kinds of money on its trip from Miami to India. American dollars and buffalo nickels at one end; Indian rupees and annas at the other. (A rupee is worth 30 cents, there are 16 annas to the rupee and a 10-rupee note is practically a \$3 bill).

Meals for the most part are eaten at American-operated messes. Even so, there is danger of picking up a bug that can cause a digestive upset.

Liberator Express plane at Natal, in the hands of mechanics repairing the propeller governors.

In India you sleep under your individual mosquito bar, to avoid the malaria-carrying mosquito. When you go to the movies, held outdoors unless the monsoon season of heavy rains drives you indoors to the Bamboo Theatre, you anoint yourself with insect repellent, and wear GI shoes or mosquito boots to cover your ankles.

Early trips of the Fire-Ball airline were pretty rugged. One crew made three legs of the 14,000 mile journey with only two hours of sleep.

The cargo planes used at first were made-over B-24s, complete with bomb-bay doors that made loading difficult, and tended to throw the plane's center of gravity toward the tail. C-87s avoid this danger. Further, today's cargo-carrying pilots are schooled in weight and balance and aerodynamics and cruise control. They know that proper loading induces safe flying. It is a science

Native in Nigeria carrying a gas can for plane fueling.

worth mastering to load your plane so it responds properly in the air.

Fire-Ball pilots carry a minimum of luggage, and yet that covers quite a range. In the air they dress for warmth and comfort; in India they wear thin khakis. When they stop for a night in any Army camp they are subject to the rules prevailing there, and those rules may prescribe a Class A uniform to be worn in the mess hall and on the street. So they take along a Class A uniform — trousers, tunic, necktie, cap.

Laundry presents a terrific problem. Sometimes the men leave it at an airport and pick it up on their return trip. Laundry work here in India is dependent on the weather, because it is dried outside in the sun. Soap is not used for washing clothes in India; the clothes are beaten against a rock — with tears and smashed buttons a frequent result. Sometimes in a pinch you rinse out your own underwear and socks with GI yellow laundry soap. Fire-Ball crews find themselves frequently buying new shirts and underwear.

EVERY Fire-Ball plane carries all the devices for safety that modern aviation technique has devised. Parachutes are complete with a jungle kit containing emergency water, fever pills, a jungle-knife for hacking your way through trouble, a compass, compressed food. For flying across water there are life-rafts, which are actually inflated and inspected every 60 days for leaks. Very pistols — well known to sailors — are also included, and a green powder that, scattered over the surface of the ocean, makes a brilliant signal to planes overhead.

There is a further item required in international flying: pyrethrum bombs for killing off any insect pests before you land in any foreign country. Even so, the local health authorities often come on board and spray the plane and its contents — and the crew — with insecticide fumes before permitting anyone or anybody to be unloaded.

Fire-Ball crew members do little shopping abroad. One reason may be that they rarely see anything as good as can be bought at home. Another inhibiting factor is the duty which Army flyers on these runs must pay on anything they buy and take home. Passengers, on the other hand, are allowed to bring home to the United States $100 worth of purchases duty free, provided they have been out of the country more than one month.

Commuting from Florida to India has its amusing side. Take the pilot who, flying home across North Africa, made three stops in a row just in time for breakfast. It was good American food. But after his third breakfast he couldn't look pancakes and sausage in the face again for a month.

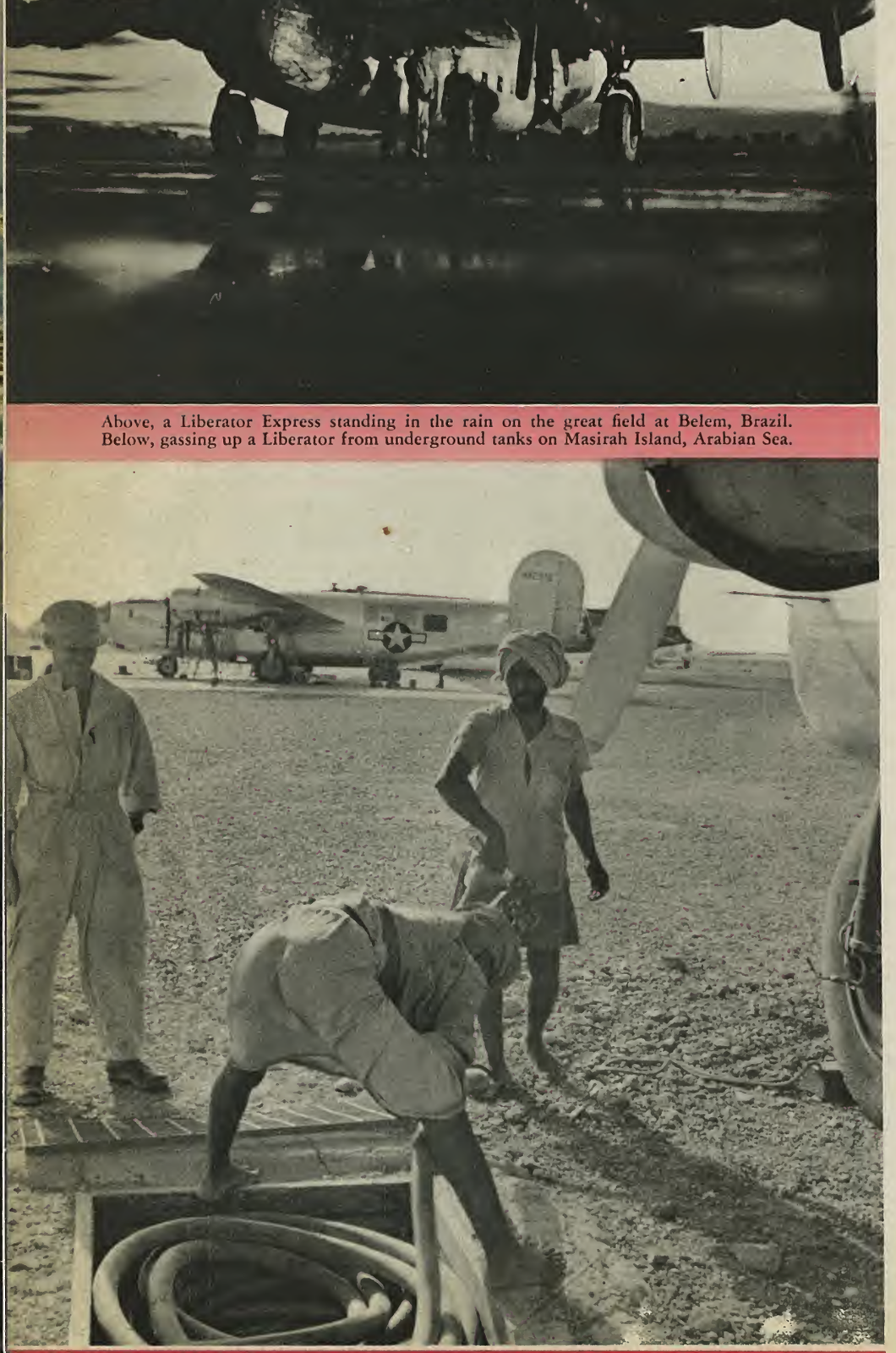
Like all men in uniform in this tedious war, these flyers have to turn to the papers to find out what is going on. Sometimes the battles being fought in the comic strips seem more real and exciting than any they as yet have been permitted to share. (They say, around Assam, that "Wash Tubbs" gives more details about flying the Hump into China, even down to distances between places, than airmen are permitted to tell in their letters home.) The editor of the "Fire-Ball" wrote this item recently:

> Just to keep you posted on what goes on with our comic comrades:
>
> Those of you in the Terry-and-the-Pirates country might do well to look around a bit. Madame Shoo-Shoo is about to make a break from the fiends that hold her in their power. You all might be able to lend Terry and Flip Corkin the helping hand that will find her. By the way, we think we know who Madame Shoo-Shoo is, but we ain't taking no bets.

Another item from the same paper refers to the fact that our airmen manage to exchange good addresses frequently, so

The airfield at Ascension Island was hewn from solid lava rock in 91 days, is an important base.

Above, a Liberator Express standing in the rain on the great field at Belem, Brazil. Below, gassing up a Liberator from underground tanks on Masirah Island, Arabian Sea.



that they seldom lack feminine company in port:

> There are interesting names and addresses to be found inside the small removable buttons located in the center of the wheel of the control column of our flying freight-cars. One, Susie by name, recommended to be a warm little number . . .

And so on, and on, in the manner of normal young men living life to the hilt.

RADIOMAN Thompson had an interesting experience not long back. The plane was coming into Masirah Island. As usual he had his ears glued to the phones. For some reason not yet understood the station directly underneath did not come through to him. So he had to work through to a station 1200 miles behind him to get landing instructions.

"That isn't surprising after the first time," he says. "Over here in India you sometimes hear the control-tower at the airport in Chicago, directing traffic at the airport, but you can't hear the stations in India. It's a queer kind of a radio skip."

Most of the Fire-Ball crew members have had a reasonably safe and uneventful time flying for the Army. Bob Cochran, for one, has baled out.

It happened last January. He and the crew with him were flying another Fire-Ball plane, and somewhere in Central India they were lost in an electrical storm and had to hit the silk. Parachuting to earth in the dark was not scary, says Cochran. But sitting in the jungle, with his knife in one hand and his .45 in the other, and hearing noises and not knowing whether he would step off the edge of a cliff if he moved ten feet — that was terrifying. All five crew members dived ten seconds apart and landed within a quarter mile of each other. All survived and reached safety together.

They don't go in for many jungle experiences, however, in the Fire-Ball airline. They much prefer the routine of safe take-offs and safe landings. They are not daredevil take-offs, not daredevils, but slippers-by-the-skin-of-the-place lads, every one of them. Further, most of them are strangely unassuming and modest.

This is surprising. You'd guess that they would be about as popular, and sought after, as any men in Uncle Sam's air force. Just consider: They bring all the latest news, songs, gossip, and newspapers from home. Why, how can they help being popular?

But it doesn't work out that way. Actually the very importance of their work makes them clannish and secretive. They do not brag that they took off from Miami just a few evenings ago — so they aim to make themselves obscure and unnoticed.

They are not encouraged to chat about their doings. Too many of the men they meet in Army camps are already homesick for home: why rub it in that these select few will presently be back in Shangri-La for a goodnight kiss from the Missus and fresh, clean, rich cows' milk that you can really drink? Bragging about their work would only create ill-will and jealousy among their mates, and invite mischief from the enemy. So they don't talk.

This secrecy tends to throw men of every Fire-Ball crew together far more than the average crew of any ordinary airplane. They develop their inner resources. Thus when Lieutenant Sweet found he needed a haircut recently in India, Sergeant Fleming offered to do the barbering. Because it was his first attempt at a haircut he set the price low: two Indian annas, or about four cents.

They learn to relax. Flying across oceans calls for adherence to a schedule, but the schedule is sometimes revised because of unfavorable weather. Anywhere in the Army you have lots of time to kill. Phil Sweet has a way of slowing down anybody who is taking himself too seriously, and feeling that his time is being wasted when he is delayed somewhere for an extra 24 hours. "Oh, you're winning the war," says Sweet gently. That brings a man back to earth.

These flyers of ours are the men to think of when you read of new successes in the China-Burma-India theatre of the war — of more and more supplies being flown across the Hump into China — of more and more Japs being driven back to where they came from. This is not only a war of production; it is also a war of transport. To put American production swiftly where it is needed is vital. The job being done by the Fire-Ball airline is so successful that you will probably hear that this newest activity of our Army's Air Force is to be enlarged and extended.

Like Baking a Cake

DURING this war we have actually learned how to make tools out of plastics. They are not substitutes — they are better, and are made far more swiftly, than the metal tools formerly used.

The business of fabricating these plastic tools and parts sounds like a job for well-trained chemists. But the Manufacturing Research Department of Consolidated Vultee has developed one such process to a point where it can be readily mastered by even the most inexperienced housewife.

The process involves Toolite, an amazing new thermosetting plastic which is produced for the company by Adhere, Inc., of Los Angeles. Although it is lighter than magnesium, Toolite has physical properties which make it superior in many respects to aluminum and steel.

Its compressive strength ranges from 10,000 to approximately 20,000 pounds per square inch. It has high-glaze surfaces, and can be cast to within 1/32 of an inch of an exact size. It can be machined like very hard wood. It is fireproof, and a non-conductor of electricity. It is impervious to water, oil, acids, and ordinary cutting compounds.

Moreover, according to Leo C. Wilson, the company's plastics expert at San Diego: "Our process for fabricating parts from Toolite is as simple as baking a cake. First, we mix the 'batter' in an ordinary cake mixer; then we 'butter' a mold with wax, fill it with the batter, and place it in an oven for a specified number of minutes or hours. And, except for washing the dishes, that's all there is to it."

Toolite has proved to be of particular value to the aircraft industry because its great compressive strength makes it suitable for use in fabricating form blocks, dies, drill jigs, checking fixtures, and other vital tools. Furthermore, the fact that the material can be cast to close dimensions — so that it does not necessitate the extensive machining required by metals such as aluminum — has enabled Consolidated Vultee to employ skilled machinists on more essential jobs.

To date, the most startling accomplishment with Toolite has been in the fabrication of legs and arms for a radial drill press. Experiments are currently under way to find out whether Toolite can be used in the fabrication of structural airplane parts.

The basic formula for Toolite was developed by Emric W. Berger, chief of Manufacturing Research for Consolidated Vultee Aircraft Corporation.

Toolite is stirred by a large mixer, and the catalyst, like baking powder, is added slowly.

A girl "butters" the mold with ordinary wax.

The mold is placed in a big oven for "baking".

Removing hardened Toolite from the mold. Below, Toolite is being cut with a bandsaw.

This is a Liberator Express transporting wounded. Below you see interior, outfitted with movable litters. Information transmitted with the photo does not tell whether woman in the lowest bunk on left is a WAC or a nurse.

EVACUATING WOUNDED BY AIR

By Lt. Col. Richard L. Meiling, M. C.
Air Surgeons Office

More than 173,000 sick and wounded patients of the United States and Allied forces were evacuated by military planes in 1943. In this crucial year of our invasion of Europe, the figure will be much larger.

Liberator Express planes are being used to transport the wounded long distances; and the versatile Stinson "Flying Jeep" has now been converted so that a wounded soldier can be picked up and flown off the battlefield right under the nose of the enemy.

AIR evacuation of war casualties — the wounded, injured, and sick — is being used to a very wide extent during the conflict in which we are now engaged. The medical service of the Army Air Forces has pioneered the development, the planning, and the establishment of an organized air evacuation service.

The first use of the airplane to transport war casualties was accomplished during the conflict of 1914-18. Doctor Chass... the French Chamber of Deputies ... oped what is said to be the first ... ambulance actually used in evacuating ... tle casualties in France in early 191...

It remained, however, for our ene... Germans, to be the first to adapt air ... tion to the mass movement of war ca... ties. The German press reports pres... impressive figures of the number of p...

evacuated by air during the Spanish conflict in 1936-38, and during the present conflict throughout the Polish, Norwegian, Lowland, Balkan, Russian, and Libyan campaigns.

It was in the spring of 1942 that the War Department made General Arnold, the Commanding General of the Army Air Forces, responsible for the development and operation of all air evacuation throughout the three components of the Army of the United States.

Under the direct personal supervision of the Air Surgeon, Major General David N. W. Grant, over 220,000 patients were evacuated up to May 1, 1944 by the Army Air Forces, flying side by side with the Navy, Marine Corps, and Allied Air Forces in every battle area throughout the world. The patients have included, with few exceptions, every type of injury, wound, and disease described in medical literature.

Patients who may not be favorably considered for a long, arduous surface trip, with its attendant shock and physical stress, may be transported by air without undue hardship or embarrassment.

Organized air evacuation, as accomplished by the Army Air Forces, does not require specially built or designed planes to be marked with the Red Cross insignia. The cargo transport planes which fly airborne troops, paratroopers, equipment, supplies, and material to the forward areas are readily converted in a few minutes to carry patients on their return flight to the rear areas. Air protection of fighter planes is provided as required for these transport planes, both on the offensive mission and on the "mercy mission."

General Grant early realized the need for medical air evacuation units, and these were first organized during November of 1942. Air Evacuation Transport Squadrons are composed of five flight surgeons, a medical administrative officer, twenty-five flight nurses, and sixty-one enlisted men. Each Squadron is organized into a headquarters section and four flights. Each flight is commanded by a flight surgeon and is composed of six evacuation teams. An evacuation team, consisting of one flight nurse and one staff sergeant (surgical technician), is normally assigned to each plane to provide medical care for the patients while en route.

Army Air Forces units aided in mass evacuation during the Burma and Java retreats. In August, 1942, air evacuation began in the New Guinea campaign and has not ceased. On September 3, 1942, Marine Corps Transport Squadrons began air evacuation from Guadalcanal; they were shortly thereafter joined by Navy and Army Air Forces Squadrons, and the three are working side by side in this theatre today. It was an Army Air Forces flight nurse who was the first white woman to land in Guadalcanal.

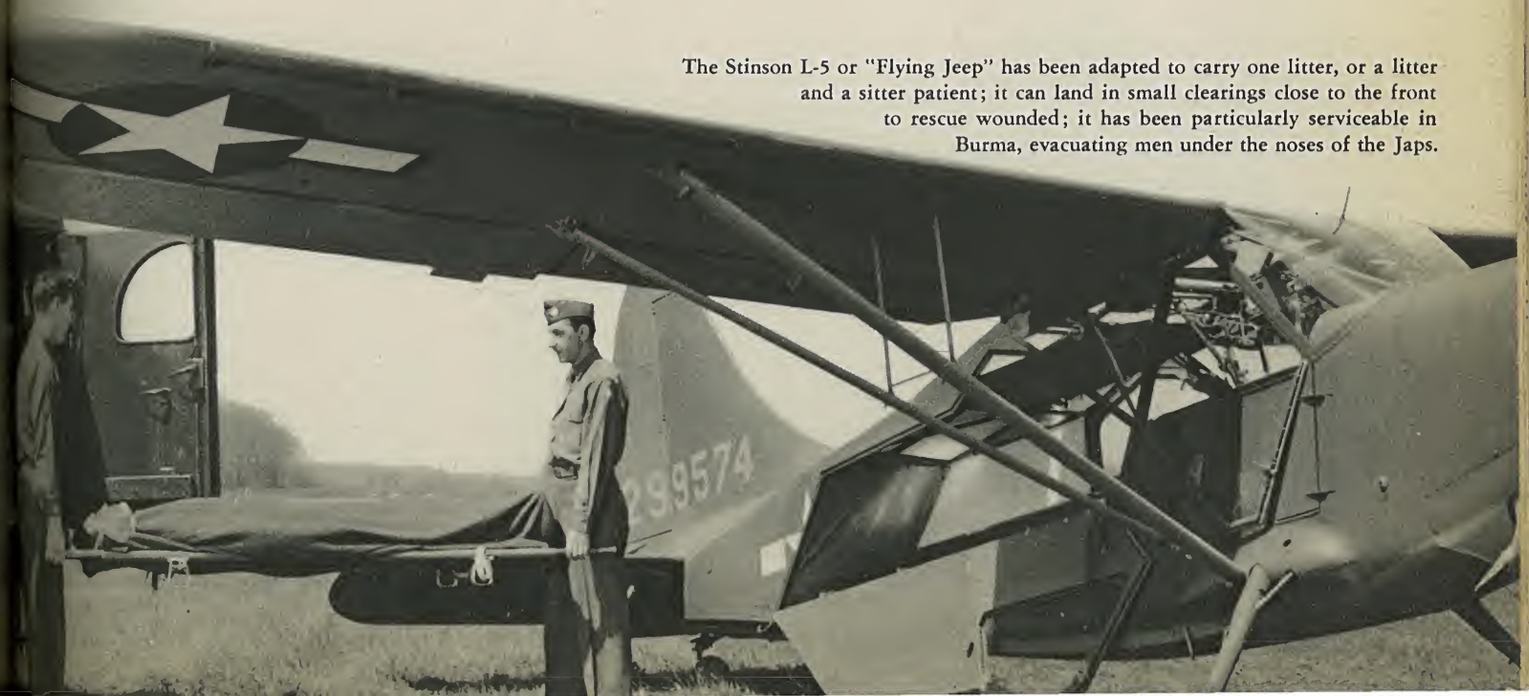
In the Middle East it has been stated that air evacuation was the salvation of the medical problem. The United States Ninth Air Force assisted in the air evacuation of the British Eighth Army from El Alamein to Tunisia, and later during the Sicilian campaign. At the same time air evacuation was used for moving patients from the Persian Gulf, from Palestine, and from Eritrea to Cairo. Had transport or hospital ships been available, the movement of these patients would have required more than thirty days. By air it required twelve to fifteen hours.

During the North African and Italian campaigns, the Twelfth Air Force accomplished a most remarkable feat. Between November, 1942, and January, 1944 this Air Force alone evacuated more than 58,000 patients by air. No accidents occurred and only one patient died en route.

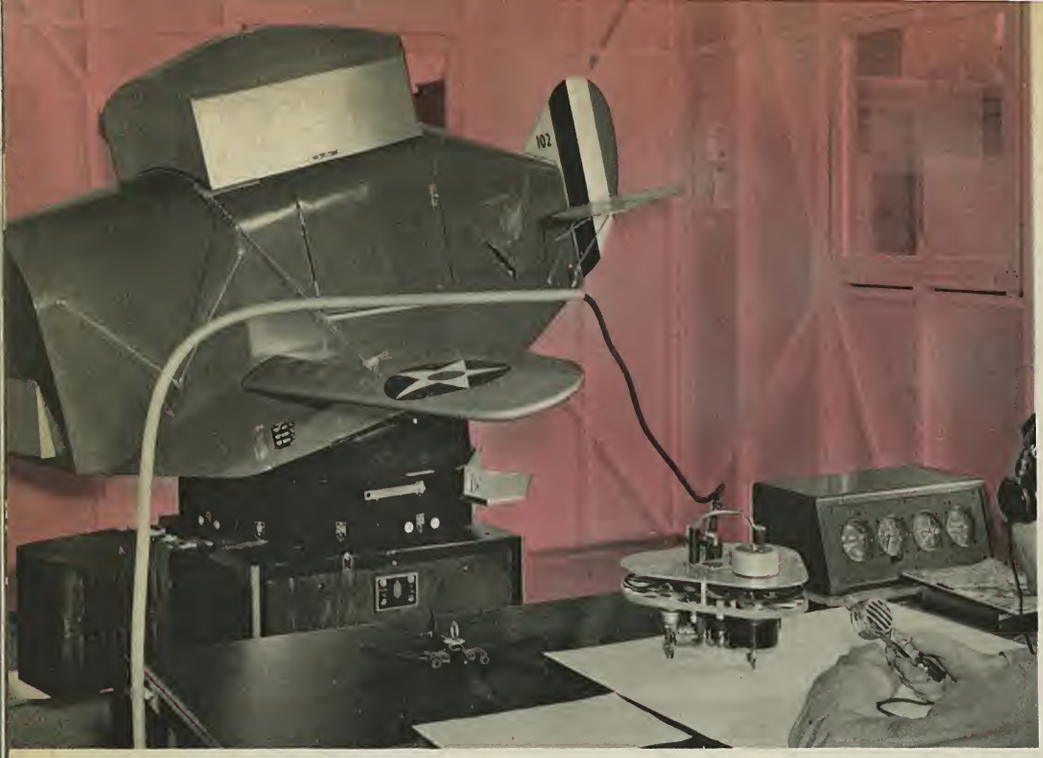
And now a word about evacuation from the theatres of combat to the United States. This phase of air evacuation is also accomplished aboard planes of the Air Transport Command. During one recent month the Air Transport Command transported 3839 patients along the global air routes back to this country.

Had the patients from Karachi, India, been returned by hospital ship or transport ship, it would have required a minimum of two and one-half months' travel. By air they were en route less than one week. Consider how this affects the patient's medical course and his morale.

Had these 3839 patients been gathered together at one port it would have required a minimum of eight hospital ships plus crews and medical personnel. They were, however, scattered throughout the world. By the utilization of these Air Transport Command planes these patients were returned to the large medical facilities at no additional cost in fuel or equipment.



The Stinson L-5 or "Flying Jeep" has been adapted to carry one litter, or a litter and a sitter patient; it can land in small clearings close to the front to rescue wounded; it has been particularly serviceable in Burma, evacuating men under the noses of the Japs.



Left, Link Trainer, in which pilots learn all their flying maneuvers without leaving ground.

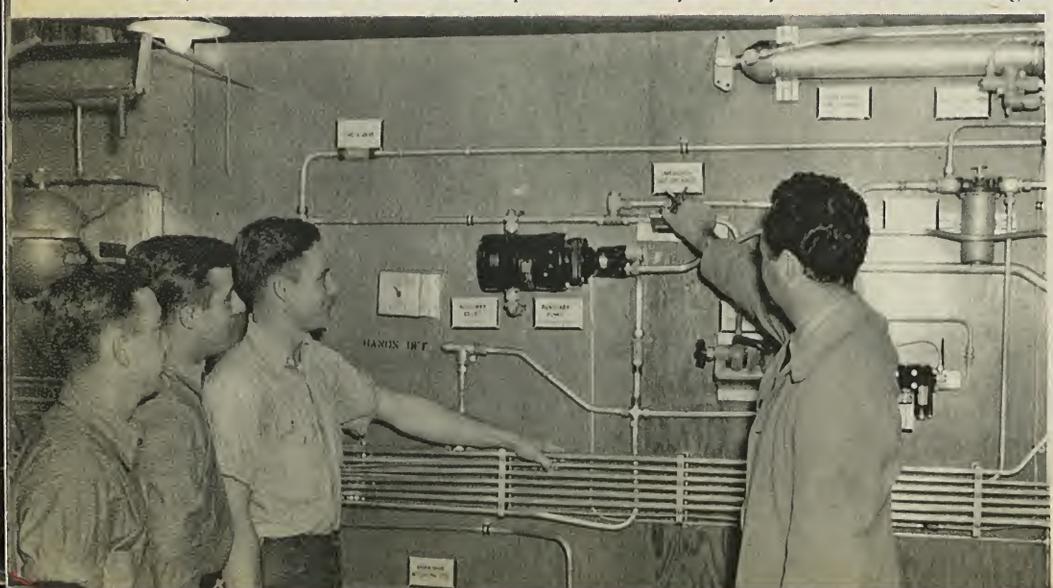
Making Liberator Experts for the Navy

ALTHOUGH they have been seeing action on global battlefronts with the Army Air Forces for more than three years now, Liberators are comparatively new to the Navy. The Navy experimentally used standard Army models of the bomber in the beginning, but the Army model did not prove entirely satisfactory for specialized Navy missions. Hence a Navy version of the plane — the PB4Y — was created.

A special school to train Navy men in Liberator operation has been established by the Navy Department, in collaboration with Consolidated Vultee, at San Diego, California.

The school is a reincarnation of Camp Kearney, one of the nation's largest training camps for the Army in World War I, now called an "Auxiliary Naval Air Station."

Below, instructor uses full sized "mock-up" of Liberator hydraulic system to show its workings.



Many of the veterans at the school got their baptism of fire in Consolidated Catalinas, which served the Navy as everything from cargo planes to fighters during the early months of the war.

All of the officers and men at Camp Kearney have an intense respect for the "old Cats" — even those men who were shot down in them. "The Catalinas were about all we had when the war began. And that much was fortunate, for a better all-purpose flying boat was never built," said one veteran.

The Navy has its own staff of commissioned instructors for the flight training program at Camp Kearney, while ground school work is taught by civilian instructors from Consolidated Vultee's Industrial Training Division.

Subjects currently taught at Camp Kearney include pilot training, radio, maintenance, automatic pilot, hydraulics, oxygen system, control systems, electricity, engine mechanics, and structures — all with particular reference to the PB4Y. Individual courses may last from two weeks to two months, depending on the ability of the student. Average duration of the ground school courses is about a month.

From the standpoint of interest, the maintenance course is probably the favorite of the ground school series. Here both officers and men learn all that is worth knowing about Liberator guns, gunnery, and bombsights. The gunnery classroom is as popular as a Penny Arcade at Coney Island. Among the numerous gadgets are toy guns that are as accurate as real guns, and moving model aircraft targets which are as hard to hit as the targets encountered by men in actual combat.

The Link Trainer schoolroom, which contains four of those remarkable devices that will "do everything but tell you how to fly," is popular with even the oldest Navy veterans, who go here to brush up on instrument flight procedures.

All lectures are accompanied by practical demonstrations, and every student has an opportunity to learn by doing – not by listening. Pilots spend most of their school time in the air, and enlisted mechanics learn the most important tricks of their trade by work on the flight line — tearing Liberators apart and putting them back together again. Paper work and theory are held to an absolute minimum in every class.

Purple Heart Corner

1. The Men Who Invaded by Air

By Charles Corte

Of Acme News Pictures, Inc.

As a war correspondent-photographer taking pictures on many fronts, I was among the first to land in North Africa, went through the Tunisian campaign, saw the surrrender of the German and Italian armies at Bizerte. I was with the first wave to land in Sicily, continued on with the troops into Messina. I photographed the battle on the beach of Salerno and saw our soldiers capture Naples. And in England I saw the invasion of Western Europe get under way.

Now, as I write, the newspapers are bursting with news of our landings in France and lots of people are going in for extra praying and others are just drinking something extra to celebrate. As for me, I'm reporting to Halloran Hospital for treatment. So I'm not there with the guys setting up for business on the Kraut side of the Channel. But this seems a good time to say one thing. So far as the invasion of Hitlerland is concerned, our airmen began theirs a long time ago.

There is a place in a flight formation — the lower left hand corner — which is usually the most dangerous spot of all. The plane here does a vital job in protecting the other planes — and is itself in the most exposed position in the formation. Only crews with a fine record are placed here. It is an honor that every crew wants — and dreads to get. For the crew that is put in that exposed corner usually comes home to base — if it comes —with adventures that get its men cited for a Purple Heart. That's why this position is called Purple Heart Corner.

Now, without stretching things a bit you can say that the air forces as a whole have occupied the Purple Heart Corner of this war. No credit and glory can be taken from the infantrymen and other soldiers who must do their job on the ground. You yourself can never realize, unless you've been there, how it feels to be a parachute trooper, dropped like a time-bomb into the midst of the foe; or what it means to rush up a beach, soaking wet from the sea and stinking with your own nausea and facing your first fire and knowing that cold need — for the first time in your life — of killing or being killed.

Nothing they ever told you in home or school prepared you for this. And though the Army has done its miraculous best in a short time to teach several million greenhorns the facts of life as it is lived in our time, the guys on foot are bound to have tough going in the beginning.

So believe me, I'm not belittling the boys on the beaches when I say the airmen have had a more terrible job still. They have literally blasted the way for the ground forces. And when the relative casualties in the different services are known you'll realize just how hazardous that blasting

has been. Our Liberator crews, for instance, literally died at Ploesti like swatted flies falling in a fireplace. I talked to some who came back and that's the phrase they used.

This kind of invasion of Europe has been going on for a long time before this June.

In the different war areas I've come into close contact with the men of our Eighth, Ninth, Twelfth, and Fifteenth Air Forces, as well as the air units of our allies. I've been with them when they got back from missions, unable to talk but so relieved they would snatch up a handful of dirt and kiss it; and I have been with them on the 72-hour leaves in London when — suddenly garrulous and at ease — their main object was to trade three months' pay (some $900) for a few days of as much delight as the resources of London can offer. There is just one way to describe them. They are a magnificent breed.

They are ex-butcher boys and ex-office boys and ex-farm boys and ex-college students, all mixed up. And, incidentally, don't you think they are coming back to be butcher boys or office boys again. The Army Air Forces has done an extraordinary and magnificent job of screening men; those it brings through to final training, and graduates into action, are A No. 1 lads. All of them are so young they are practically still wet behind the ears. You can be a Colonel in the Air Forces and still be in your twenties. And all of them know the responsibilities of authority; a technical sergeant in a ground crew can keep a General from taking a plane out, if he says the word.

Now you look at these men drinking deep of life's honey on their leaves, and you see them with more spending money than they ever had in their lives (even a technical sergeant gets around $234 a month, plus keep and clothes), and you spot them in their comfortable bases—bases almost always well back of the lines — and see them fresh shaved and cleaned up and showered, and you think, "Isn't that the life! God, what aristocrats! Who'd want to be in the infantry?"

And then you get to know them, and slowly you learn what they go through.

Not that they ever really tell you. They can't. There are hells terrible beyond words. If you yourself haven't discovered this, be thankful. The Flight Surgeon in every squadron is always on the watch, to spot a man before he really breaks under the strain. Then he takes that man quietly away and there is a vacant place in the mess hall to fill up and no one talks about it; and the crew gets a new man aboard, and likes to show off for him, and that helps relieve its own tension for a little while.

All airmen — pilots, navigators, bombardiers, radio operators, gunners — are deeply stirred before, during and after a mission is completed. They are emotionally keyed up in the briefing room. Their tension reaches a greater peak when they step into a plane. Many, without being ashamed of it, confess they're frightened before they start a combat flight, even if it's their tenth or twentieth.

They all pray — all crews attend religious services — before they take off. If the chaplain isn't of their particular religion, they pray with him anyway. Like the infantry, they pray for a quick death, if death is in the cards for them. They say, "I don't want to see it coming." All alike suffer, at sometime or other, from "nerves." Some snap out of it a few minutes after returning safely to the home flying field. A cigaret and a hot cup of coffee are enough to bring them back to calm, as though they had just returned from a bus ride to London. Some need a short rest before they can continue flying. A few may eventually be marked unfit for further combat.

Imagine it yourself: To be in a Liberator so high in the icy stratosphere that its metal would freeze to your bare hands. To sit shrouded in wool and armament and mask, all so heavy you can hardly move. To crouch in semi-dark for hours. To find your thoughts merging into uncontrollable fears that gnaw at your belly, then balloon out until they surround you and you can touch them. For they have become yourself looking at you in a mirror.

You don't want to show that self to your side kick. You're proud. You find excuse for a wise-crack and a laugh. "Bandits at ten o'clock" comes over the intercom phone. Seas of brown flak flow around you. Now you can explode in action. You and every other gunner become human calculating machines, computing speed, path of plane, height. . . . Some of the fear can pour out through your muscles. You are suddenly released from thought. Now you can even lose an arm or a leg and not know it. Lots of fellows have. You can start bleeding to death and not know it. Doubtless, if your

plane explodes in fire and you fall like a torch into the streets of Berlin, you don't know it either.

But after the action is over thought can pour in again, like a suffocating dream that comes every night as soon as you start falling to sleep. Except that this comes always when you lie wide awake, and you remember seeing your co-gunner collapse under a 20 mm. shell, and wonder when one with your name on it will come along.

The next day and the next alert you're right on deck again awaiting briefing. "The biggest heroes," I once heard a chaplain say, "are those with the biggest fears who go right on regardless." After briefing you again rush to the old ship and grin at the ground crew. And each guy in the ground crew looks at your ship like a doting father.

Then one day you're assigned to "Purple Heart Corner," and the ground crew guys congratulate you, and cuss you out a little, and call you lucky bastards.

They are right there on the field in the same spot when you are scheduled to come back, too, "sweating it out" while they await your safe arrival.

Or maybe this time you don't come back. All the other planes are down, and the field is pretty well emptied of men. But your own ground crew still solemnly scan the sky, and ignore mess call, and try to crack feeble jokes until they can't do that any more and stand silent — hoping you straggle in like with a feathered prop. And then, after awhile, they hope that you pancaked down somewhere in France, where the underground will get to you first and patch you up and lead you back to England. . . .

This is what I came to know about the job of airmen who have been invading Germany for a long time, before our ships and soldiers ever landed on European shores.

Liberators bombing Nazi installations that block invasion in France — one ship evidently aflame.

2. The Machine That Struck at the Guts

By David C. Cooke

Via Air Mail from London

No matter what military forces we put on the continent as our invasion gathers force, it is logical to expect that the Strategical Eighth Air Force will remain in England as a unit — that it will continue to operate only from established airfields there, until the German Luftwaffe and army as a whole are eventually crushed beyond any shadow of doubt.

The Eighth has been the long arm of our Air Forces — the arm which has done so much to make possible today's headlines, which phrase for all to read the waning power of the German forces in Europe.

To make land invasion practical, it was first necessary to secure air superiority. That meant not only destroying Germany's planes in the air, but also razing the facilities which made Germanic air power possible. Without the Eighth Air Force and the work it has done and is still doing, Germany would have been able to re-equip her air squadrons and once again become a potent force. But, as the event proved, they did not even dare to risk the remaining remnants of the Luftwaffe in mass air attacks on our landing forces June 6th. Our established air superiority thus gave us this enormous advantage in establishing our first bridgeheads on the continent.

Without the Consolidated B-24 Liberator it seems doubtful that it would ever have been possible to bring the once-mighty German Air Force to its knees in such a reasonably short space of time.

The Lancasters with their 12,000-pound super-blockbusters have done much in the way of blotting out enemy cities. But flying at night as the Royal Air Force heavy bombers do, it is difficult to put bombs in the exact small space where they might be needed. The British themselves know, as well as any, that today's wars could not be won in a short time by these methods.

During the so-called blitz days of 1940-41 the Luftwaffe tried to crush the English will to resist through indiscriminate bombing of large cities. Many of England's manufacturing areas were meanwhile left virtually untouched. The British, through it all, were able to continue production of war equipment, and eventually turned this against the Nazis.

Strategic bombing of the type undertaken by the Eighth has not sounded nearly as spectacular as the blotting out of cities. The Eighth Air Force has concentrated its daylight precision bombing on German factories, depots, airfields, lines of communication, and marshalling yards. The attacks were scattered — there were only small spurts of flame on the map to show where this war was being fought.

But those spurts of flame were burning up the really important manufacturing, supply and maintenance areas. Day by day Germans have thus been forced to scrape ever further into their scanty reserves in order to maintain front-line strength. Consider our own country to see how logical this is. The aircraft companies building our fighting and bombing planes can almost be counted on two hands. If they were wiped out, we could not replace our aerial losses.

That is what has been happening in Germany since the Eighth Air Force began its operations. And it is largely because of the Liberator that we have been successful. The Liberator is the only American heavy bomber in operation in any number that has the extremely long range necessary to reach the many important factories which had been placed deep inside Europe to keep them "safe" from bombing attacks. Firepower and wide range of fire of the Liberators have enabled them to stand the gaff while they struck at the guts of Hitlerian empire.

THERE is no denying that on the ground the Liberator is an ugly duckling. It is squat and square. The big twin rudders in the rear look like nothing so much as overgrown elephant ears. On take-off the ship rumbles down the field like a fat old woman.

But when that tricycled undercarriage mysteriously slides away from view and folds into its deep pockets in the wing and nose, a startling change quickly comes over the plane. It is suddenly a jive chicken that is in the groove with plenty on the ball.

Bombers based in England undertake missions against Axis objectives only up to certain distances. These distances are blue-penciled on maps with hundred-mile gaps between the radii. The territories outside the farthest radius are attended to by bombers based in Italy and elsewhere.

The fighter-bombers and mediums have made shallow penetrations that no more than bulge through the first or second line. The heavies have taken up from there for the long hauls. But close study of the records will show that these radii mean very little, because they show only average penetrations from the hub. The Liberator has winged farther into Naziland than even the most advanced line, hitting positions as far south as twenty miles north of the towering Pyrenees of Spain and as far east as pre-war Poland.

With their bomb-bays bulging with high explosives to gut the strongholds of Europe, Liberators have systematically removed Axis targets that were believed safe from all harm. They have even been bombing objectives that theoretically could only be hit by planes of the closer Fifteenth Air Force operating in the Mediterranean area. Just as important, the Libs have suffered amazingly low losses on almost all of these very deep penetrations into the Axis camp. If a machine could be given a decoration for its brave work in an extraordinarily exposed position, the Liberator should rate at least a Purple Heart.

TAKE-OFF TO *Combat*

Above, Colonel Paul Hinds, Commanding Officer at Morrison Field. At top of page, a Liberator crew at Morrison, ready to take off in a bomber painted tiger-shark style.

COLONEL Paul Hinds, Commanding Officer of Morrison Field at West Palm Beach, is over 2,000 miles from the coast of Europe. But he and his staff, who serve under Brigadier General Edward H. Alexander, Commanding General of the Air Transport Command's Caribbean Wing, are as important a force in our European invasion as if they stood in Calais.

For Morrison Field is the base from which a large share of our heavy bombers that are flying over Germany have been launched on their European mission. During many months before June 6, 1944, the new planes with their fresh crews roared out of Morrison by the hundreds, and promptly went to work. While the momentous land invasion did not start until June, the equally momentous aerial invasion began in 1942 — the first American planes to enter the continent flew with the British in April of that year — and from this small start it has mounted ever since to climax. When in the course of this invasion a Liberator crew left Morrison Field for the European theatre, it would usually undergo its first fire within relatively few days.

Examine Florida on a globe, and you note that it is practically at the center of the American land-mass. This fact, added to its climate, makes the peninsula an American base of vast usefulness.

Morrison Field leads, via our Caribbean and South American bases, not only [to] Europe and Africa but also to Asia, [with] routes operable the year round, and well defended. Hence Liberators that will [be] flying the Hump from India into China [go] through there, as well as a great number of the Fortresses and Liberators bound [for] the European Theatre. In recent months there have been times when the great planes, roaring off the runways at intervals of a few minutes the whole night long, have given the townsfolk in the area [the] less sleep.

The training of the boys who make [the] flight is complete, except for the lessons which only actual combat can teach. From the moment they leave this country they are in the war, and they will be taking bomb loads to drop on the enemy as soon as they reach a suitable base of operations.

Their night take-offs are timed so that the crews will come into scheduled [areas] in daylight hours, under the best [conditions] for landing. These crews, almost [without]

Brigadier General Edward H. Alexander, Commanding General of ATC's Caribbean Wing, at right, with Colonel Richard T. Kight, who until recently was in command at Morrison Field. This picture of the two officers was taken in India by Dmitri, when they were organizing bases there for American use.

exception, are crossing the ocean for the first time. They are not going as passengers in transports. They must fly themselves. Not too long ago they knew only the horizons of farm lands and towns. Now, as they go to war, the first real test of their training comes in their job of conducting a huge air-machine to a map-dot on another side of the world. They do this out of Morrison Field by easy stages — down the coast of South America, and then a brief jump to Africa from Natal.

They come into Morrison Field flying a new Liberator fresh from the lines, ten to each crew — jaunty boys, hard in head and in muscle and a little tense in emotion – boys who were the pick among thousands before they were trained, and now are harder still.

The boys will range in age from 18 to perhaps 24. A third of them, perhaps, will have had some college education — the others the equivalent of High School. At least half of them, on the average, have lived their lives on farms or in little country towns.

This is the typical makeup of a crew that mans America's four-engined bombers.

"We have sent out enough planes from this field to stage 2,000-plane raids over Europe for days and weeks on end." The speaker was Colonel Richard T. Kight, until recently the Commanding Officer of Morrison. Colonel Kight had previously served under General Alexander in India, in the organization of the bases needed there for America's Far East operations. "We have had remarkably few accidents, have put the planes and the crews where they were needed, promptly on schedule," the Colonel continued. "It has been a job of organization. All of us can be proud of it, because so many millions of Americans have had a direct part in it. One result of it is that from here to China, America has a new meaning among all the peoples of the world."

Colonel Hinds, who succeeded to the Morrison Field Command in late May, when Colonel Kight was called on an important new mission, has been a senior pilot for some 16 years. A close friend of Colonel Kight ever since the two met at Langley Field in 1938, he was serving ATC in British Guiana when he was called to Morrison a fortnight or so before the actual land invasion of Europe started.

"We do not know what history will be written in Europe this year," says Colonel Hinds simply. "But one fact is clear. No land invasion at all could have been attempted in Western Europe in 1944, but for the heroic work of the men who for months previously blasted the way for the ground forces, and manned the bombers with which the job was done."

PRACTICALLY all of the crews that you see flying into Morrison Field — often scores of them at a time — have had a final leave to visit homefolks, and now are grim with the business ahead. At the train-

ing base they have left behind, whether in the east or west, war was still distant. At Morrison there will be no leave, even for a few hours.

They come in by day, are guided to a landing by the control tower, are met at the plane by a shuttle bus that takes them immediately to the receiving room. The pilot of each crew is at once the officer in command, the spokesman for his crew, the *pater familias* of his men. He turns in the prescribed forms and orders, receives his instructions concerning Morrison Field routine.

The four officers of the crew — pilot, co-pilot, navigator, and bombardier, then go to their billets in B.O.Q., a term for Bachelor Officers Quarters that is otherwise referred to as Hotel de Gink. The six enlisted men, who usually have the rank of technical sergeants, are billeted in the transients' quarters.

For this first evening at base, the men can be their own bosses. They can go to the post theatre where new films, and occasionally USO shows, are offered; they can play golf and tennis; they can have a session at cards or bingo; they can rest up for coming strains by just going to bed. Early sleep is recommended. Promptly at eight the next morning their heavy routine will begin.

That routine is a series of inspections and briefings with one objective: To assure that they arrive safely, and completely equipped, in the theatre of war for which they are headed.

Pilots and navigators, for instance, go through a briefing in which motion pictures show them, step by step, the exact route they will travel down the coast of South America to the next base, where they will get a similar briefing for the second leg of their trip.

The officer who gives the instructions is no theorist, but a pilot who flies the route himself every few weeks, to keep his practical knowledge fresh. Time and again he emphasizes to his eager audience that they will at no point be more than a few hundred miles from land. No matter what may go wrong, nearby bases are available all along the route for emergency landings, and never once will a plane be out of range of radio guidance. Men making their first trans-ocean hop find useful reassurance in such knowledge, however unlikely an accident may be.

The route is first flashed on the screen in great detailed maps. Then the maps are dramatized by motion pictures that show exactly what the pilot and navigator will see when their Liberator takes off from Morrison Field, when it passes island bases en route, and when it comes into scheduled landing fields.

Engineers have a separate briefing of their own. An officer reminds them anew of all they have been previously taught in their training, reiterates every factor in safety operation they must watch over, and says:

"Remember this: if you have any reason to think your ship unsafe, you can always ground it at any base with a red pencil — until an engineering officer rechecks it. It isn't the fellow who knows danger who gets into trouble. It's the fellow who doesn't know. Never guess. Be sure to inspect your ship thoroughly and frequently while it's in service. Do two things: know what to look for — and look."

Radio operators go through a technical briefing similarly. They are about to have their first practical experience with frequencies in trans-Atlantic navigation. If they do their jobs properly, they will never for a moment be out of touch with ships in their own squadron, with bases en route and with emergency landing fields. If, by any chance, they do get lost from their squadron, they are given two emergency frequencies, "Call your lead ship on one of those frequencies, and he will bring you in."

In the room where the entire crew receives its medical briefing, there is a sign which hangs before the boys so that their eyes will absorb what the ears will hear in detail. Says the text:

Constant Enemies To Your Health
When You Leave Here Are
1. Mosquitoes
2. Food
3. Water
4. Women

The young men have heard it many times before. It is the job of the officer now standing up before them to make them believe it, and remember it forevermore. It's One World — geographically. But much of the world these lads are going into is as different in human terms from the one they've known as night is from day. And there will be almost no pause in the transition between the two. A turn or so of the clock and suddenly all the apples these lads see in a market place may be poison; drinks that are not boiled may be contaminated; and lips that offer themselves may be full of death.

The men must be taught to react to such truisms automatically. In the ground forces men move in large units; thus a fairly constant degree of personal supervision may flow from the high command down to every man, and examples set by personal precept can usually be kept before the soldier. But in the Air Forces a small crew of men must always be prepared to function as an organism almost complete in itself — and must be trained to know and act unerringly.

That is a fundamental purpose of these briefings. The lectures are not cut and dried military pronouncements. They are man-to-man talks between officers who have been there and soldiers who are about to go through the experience for the first time.

The young men relax in their seats, may smoke if they wish, may ask a question any time to have a point clarified. Discipline in the Air Forces aims at establish-

Liberator radio operators being briefed at Morrison Field for the trans-ocean flight to war.

a mental attitude, not a physical posture.

At least one briefing session is intended to prepare the crews for possible disaster, however unlikely it may be. This is the session on "ditching." You "bail out" over land; you "ditch" a plane if you run into trouble at sea. Such accidents have been so rare on the trans-Atlantic road to Europe that the precaution taken concerning them might seem over-emphasis. But the airmen are shown in detail every step to be taken in abandoning a Liberator, in mounting the rubber life-rafts which are now a part of the equipment on every ocean crossing, and in planning for survival until rescue comes.

While the men absorb these hours of final instruction, they are checked between times for every item of equipment, to make sure that no requirement has been overlooked in outfitting. Their bomber is meanwhile being given a thorough check-over by engineers and ground crew at Morrison Field.

Between inspections and briefings, each man is given personal opportunity to take a thoughtful leave of the world he has known. He will probably come back some day. But every man must go to war not knowing. At Morrison Field he gets help from the "Personal Affairs" officer in making his will, in taking out the maximum of government life insurance, if he wants it, in making his pay allotments, if he has dependents.

Chaplains are there for a quiet talk with any young man who wants help in getting his thinking straight. Near the briefing rooms Bibles are on the wall in a rack — the Douay version for Catholics, and the King James version for Protestants, and the Old Testament in Hebrew for Jews; each may help himself. One Chaplain has posted a sign nearby telling of his availability at all times:

To Transient Personnel

A. Confessions will be heard in English, Spanish, Danish, Flemish, French, and German at any time during day or night.

B. For Blessings of Airplanes, phone Chaplain.

Such routine at Morrison Field uses up two swift days. Thereafter, a crew is deemed ready to start; notices of departure usually come around three o'clock of an afternoon. After that time can drag endlessly. Some men will write letters, some will play games, or loaf, or try to nap. An extra nap is sound procedure, for hereafter sleep is going to be caught on the run, for a long time.

A Chaplain at Morrison Field blessing a Liberator and its crew, just before their take-off.

After evening mess, the departing crews go pretty promptly to bed. They will be called by the Wake Up crew exactly two and three-quarter hours before their scheduled departure. If a man lies awake, thinking of this and that and unable to sleep (and perhaps many do), he is still instructed to stay in bed until the call to pull out comes.

A crew gets an hour for a hot breakfast. Then comes a final briefing session on the subject of the weather that lies ahead; this is last-minute information for the pilot, co-pilot and navigator. Other crew members go on to the plane, load their equipment, go through the pre-flight routine of inspection that has been drilled into them by months of training.

Once the weather briefing is finished, the pilot passes through the hands of Clearance Clerks. He pays any bills his officers have incurred, signs required forms, takes charge of all the records that must travel with a bomber crew as it goes into another area.

Out on the field the floodlights make the runways almost white as day, and rows of new silver Liberators on the aprons — no gray camouflage nowadays — reflect the glare back into the night. As a crew gathers beside its plane, an older officer from the Project Office comes to say goodbye in a brief ceremony that is also known as a briefing — a farewell briefing. The Red Cross canteen is also there on the line with coffee and doughnuts. These details add some good cheer and a festive touch to a very solemn moment in a young man's life.

The engines warm up rapidly in the balmy night of the Florida subtropics. The boys go up to the flight deck to distribute weight during a heavily loaded take-off. The signal comes from the control tower. Another great Liberator starts down the runway, gathers speed, climbs slowly into the air above the city's rooftops.

Thousands of young crews have gone this way before, from this very field. Others are to follow, this night and for many other nights to come.

Only a few years ago the very thought of an American air force that could invade Europe with thousands of planes in a single mission seemed incredible, both to us and our enemies. But by June of 1944 it could be published that planes and airmen in our 8th and 9th Air Forces, based on England, had been flying more than 50,000 sorties in a single month. More than half of the 2,357,000 men in the Army Air Forces were overseas. More than half of their 34,000 combat planes were overseas. And the first day of the west-Europe invasion by land saw an air umbrella, protecting our ground forces and hammering the enemy, of not less than 11,000 planes in the air, counting the British along with the American.

The invasion of Europe — begun first by air — was proceeding. The crews flying the great squadrons of bombers that are a part of this invasion are youngsters who—likely as not — said so long to America one night at Morrison Field.

THE Silver LIBERATOR

Now that the AAF believes camou-flage on planes is no longer neces-sary, Liberators come off the produc-tion line and go to war without the gray-green paint. Elimination of the paint reduces both weight and air drag, adds several miles an hour to speed. In early June, 1944, Consoli-dated Vultee announced it had built 7,000 Liberators to date, had contracts for still larger numbers in 1944-45

At left, Harold D. Ross and Lee A. Russell. Below (inset), Paul F. Degen.

PUTTING VETERANS IN JOBS

By Phyllis Gandee

Discharged veterans of the present war are entering industry at the rate of 70,000 per month — the majority going into war production jobs. More than 1800 veterans of World War II are at Consolidated Vultee. Here is the story of the care taken to help the disabled find the job they like.

Ross, Russell and Degen are three small-town lads who "joined up" before Pearl Harbor. Ross and Russell were stationed in Alaska during the Jap attacks. Degen was already at Fitzsimmons hospital, in Denver, when the other two arrived there, to recover from their wounds. Their serious leg injuries were similar, and the three became great pals during months of lying in bed, special treatments and lessons in walking with crutches.

They wondered what would happen to them, made silly plans and then joked about them. But deep inside, they were scared to face life now.

Then one day Russell ran across a newspaper account of an engineering drafting course at Denver University that was being conducted under the veterans' training and placement program of Consolidated Vultee Aircraft Corporation.

Three sparks of hope flared. If only they could . . . no, it was too much to expect.

But it did happen. They had the requirements, all right. Their "CO" gave his permission, and even provided a station wagon to take them to "college" daily. The three musketeers went to school — bandaged and on crutches. They even went on Saturdays just for something to do.

Today, Harold D. Ross, 23, of Winfield, Tennessee, who has been awarded the Purple Heart; Lee A. Russell, 29, of Huntsville, Alabama; and Paul F. Degen, 24, of Emmet, Idaho, are engineering draftsmen at the San Diego Division. They are three of the 1800 veterans of today's war who are doing vital jobs in Consolidated Vultee plants. After undergoing an amputation, Degen is getting used to his new limb. Ross and Russell, experts with crutches now, scoot up and down aisles of the vast engineering department.

Eight hours each night they sit before drafting tables, working over drawings of Liberators. It may be months, maybe years, before their legs heal. But they explain, with grins, "We've got jobs. That's what counts."

In assuming responsibility for placing soldiers in useful occupations, Consolidated Vultee aims to find the best job a workman can do safely and satisfactorily, then train him for that specific work.

It does not expect an easy task. There will be many veterans whose bodies are broken — many who have lost a leg, an arm, an eye, whose minds are dulled by experiences of dread. What about the "battle-fatigued" soldiers? The nervous ones? The emotional cases? The full impact of these problems will not be felt until later,

Across from left to right: Earl Buddy Gordon, now an inspector at Major Assembly at Fort Worth, was a paratroop instructor at Fort Benning, Ga. John B. Simmons, inspecting bomb doors at the Nashville Division, spent eight months at an Army Base Hospital in Greenland. Bill Cook, now testing machine guns that go into Liberators at San Diego, was wounded by shrapnel on a Ranger raid in Italy. James J. Organ, father of three children, works over ... tanks in the Nashville Division, following Army discharge after ... back injury by a half-track during last year's North African inva...

but industry is planning for them now.

Consolidated Vultee believes that regard for emotional and nervous factors in placing veterans on jobs is the most important single consideration in the proper future placement of returning soldiers.

Such factors bring up a problem of "environmental placement." This is something far more personal and specialized than mere physical placement, which is giving jobs to employes in accord with what they are physically able to do.

New questions arise: Would you put a soldier wounded by gun shot in an armament crib? Would working long hours in an area enclosed by machinery and equipment have any ill-effects on a veteran who had been interned in an enemy prison camp? Would you hand a rivet gun to an extremely jittery youngster who has survived months of bombing attacks?

TAKE for example, the story of Frank B. Clegg, who was in the Solomon Islands invasion. Clegg went to work first in the fuselage department. Then he was sent over to work in the empennage department. The noise on both jobs was aggravating to his nervous condition. A job in inspection was offered. Inspecting materials is quiet work. He feels better and his condition is improving.

What might be proper placement for one veteran might not do for another. Realizing this, Consolidated Vultee is adapting its present job placement program to include proper environmental placement.

Of the 1800 or more veterans of World War II now working on the company's production lines, many have been wounded; some have been discharged because of minor physical limitations; others are former employes in the over-age group released from service.

Every day more veterans are arriving at Consolidated's employment offices. If the veteran is able to work, he is placed on the payroll and sent into the plant.

In determining his physical fitness, the company gives him a physical examination by a skilled physician. Any major limitations he has, such as an artificial limb, loss of vision, or other injuries, are listed on his employment record. The doctor ... transforms this medical record into a ... ical code.

At this point, an employment ... viewer takes over. The job placement ... cialist consults the code. Thumbing thro... work requisitions on his desk, he find... job calling for the same physical requ... ments the veteran has. Yes, back inju... are all right for this job. The ex-sol... is signed up and sent down the line to ... fingerprinted, photographed, listed for ... surance, war bonds.

Right now, employment of rehabilit... veterans is as simple as that.

It's simple because Consolidated Vul... set up the machinery for hiring physic... limited persons over a year ago, in Ja... ary 1943. The medical department dev... a physical and job coding plan, which p... mitted the matching of jobs and per... The system was incorporated into the ... dustrial Relations job placement prog... and men and women whose physical li... tions had been barring them from a ch...

to help with the war effort began arriving at the company's employment offices. The company hired some 50,000 physically limited persons, who today are still helping to turn out vital warplanes.

In an anodizing department, for instance, you will find a one-armed man and a one-armed woman, employed on opposite shifts, turning a dial on control panels of the anodic tanks. Nearby, a man with an artificial leg runs a rivet squeezer, with a special stool to support his artificial leg while the other foot presses the pedal.

A workman who has lost vision in one eye, and all ability to speak and hear, works in material handling. Another man who lost a leg in World War I works on one foot and an artificial limb all day, dispatching parts. A young boy who has vision in only one eye sorts material. A dozen or more women who can neither speak nor hear assemble radio parts.

Many employes with impaired hearing work in noisy departments — drop hammer department, where giant presses thud intermittently; wing departments, where rivet guns roar incessantly; assembly departments, where saws slice shriekingly through sheet metal.

It was the company's experience in tailoring the job to such employes that stands it in good stead in its present program for veterans.

Wounded veterans, assigned jobs according to the placement system, are now working alongside these older employes.

At the Fort Worth plant, for instance, ex-Corporal Pat H. Stewart, former paratrooper and veteran of the Attu campaign who was awarded the Purple Heart, now works in the tabulating department, away from the din of shop noises. Young Don Mahan, marine veteran of Midway who suffered a fractured skull and three shoulder fractures from a Jap aerial torpedo, and still carries shrapnel in his right shoulder, works in Fort Worth's production department.

Dick Horsely went to work at Vultee Field as a punch press operator after receiving a medical discharge; he was injured in a crash landing as a tail gunner on a Sunderland flying boat, with the Royal Canadian Air Force. James J. Organ, an anodizer at the Nashville plant, received severe back injuries during the North African invasion.

In employing such veterans, the company is constantly discovering problems that call for new placement techniques, and is making changes in its placement program as the need arises.

Where servicemen have had experience in any way related to a job in the aircraft industry, they may qualify for that job without undergoing preliminary training. Again, for many types of work, on-the-job training can be given new employes by supervisory personnel. A college grade training program affords other veterans the opportunity of increasing their knowledge and skill in various specialized fields.

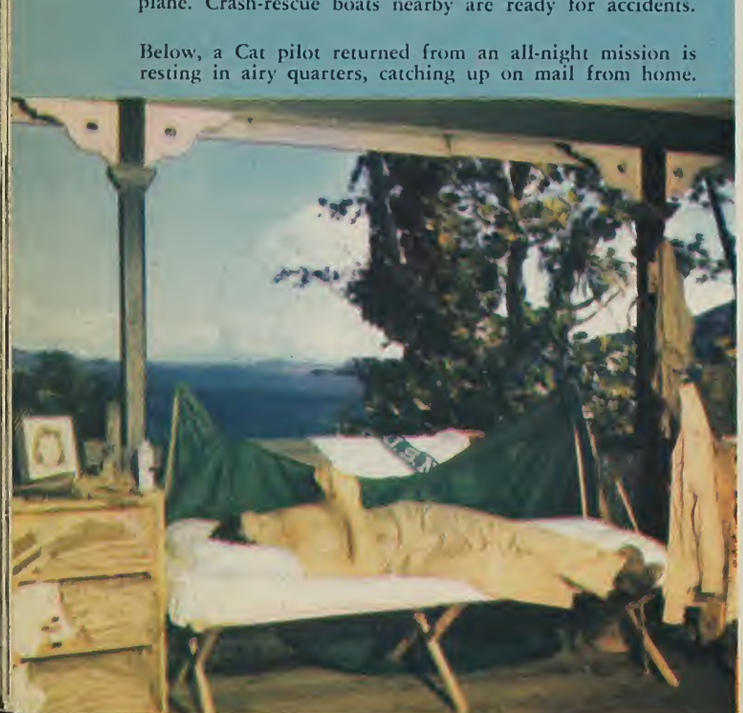
At present, veterans may be paid by Consolidated Vultee while training for placement in jobs. Training is conducted outside plants with the cooperation of local public schools, universities and colleges. Courses require from four weeks for some shop jobs, to a minimum of 16 weeks for more skilled jobs in engineering. When a veteran completes such a course, he may report to work.

This is the program under which Ross, Russell and Degen were "rehabilitated." It is believed that many more veterans, whose physical limitations are serious, will want to undergo similar training for jobs.

"Fly-by-Night" crews gather in an afternoon briefing session, are told the objectives for the mission that night.

Signalman on control tower waves instructions to incoming plane. Crash-rescue boats nearby are ready for accidents.

Below, a Cat pilot returned from an all-night mission is resting in airy quarters, catching up on mail from home.



Cat Crews IN THE PACIFIC

Though the Navy is putting specially designed Navy Liberators into service as fast as they can be made and special crews can be trained — See Page 8 — the Catalina is still its most widely used patrol bomber. Cats are used on all the seas where the American Navy operates. In the Pacific particularly they are doing a notable job in sinking Jap shipping. Some squadrons operate entirely by night. One of these paints its Cats all black so that they are practically invisible at night, and has called itself the Black Cat Squadron. Another, pictured here in official Navy photographs, calls itself the Fly-by-Nights; this single squadron was credited with destroying 58,000 tons of Jap ships and damaging another 20,000 tons in only four weeks' time. The Fly-by-Nights fly out of an unnamed isle in the lush Solomons, and the plane and ground crews operate in shifts that run around the clock, day and night.

Pilots leaving the cool comfort of their quarters in the late tropical afternoon, fresh from a day's sleep and all ready for another briefing.

Cat crewmen on the way to chow, with a utility plane floating at anchor in the bay beyond. Quonset huts make excellent quarters.

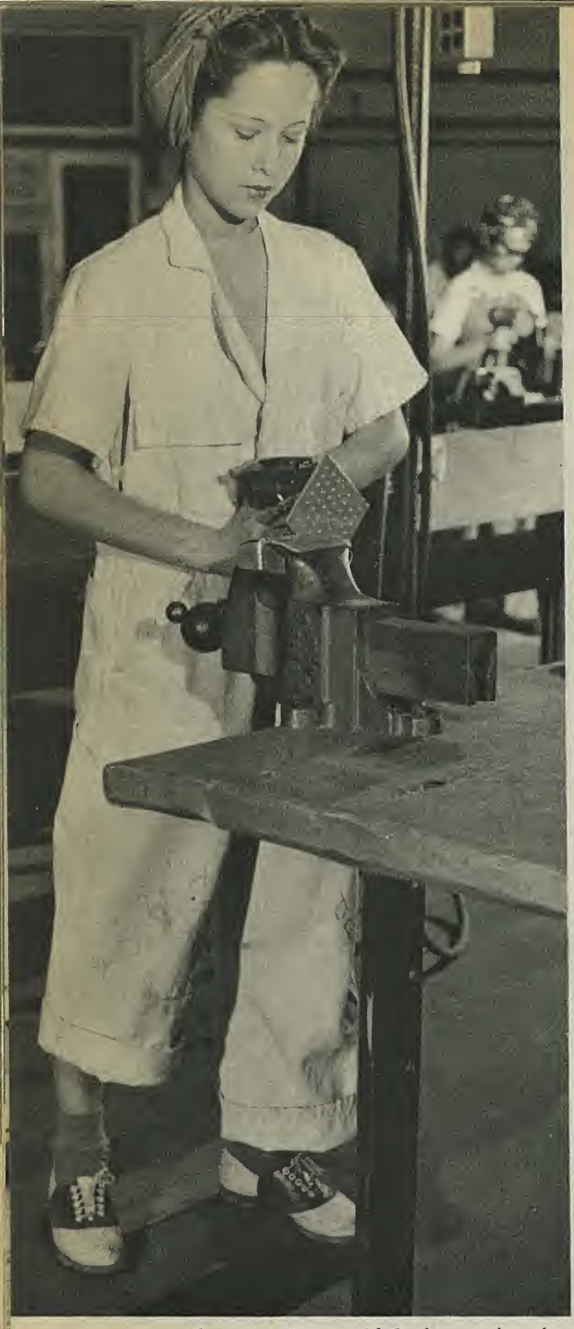
Pilots on their way from officers' quarters to the operations shack amid lush tropical green.

The machine shop used by ground crews of the squadron, with a warning meant to discourage "kibitzers".

Power plants of the squadron's Cats are given a thorough overhauling each day.

Below, a Catalina of the "Fly-by-Night" squadron taking off at the end of an overcast day from a quiet Solomon Isle harbor in the South Pacific.

Below, a Cat is "gassed up" while being overhauled for its next mission — probably an attack on Japanese shipping in the Pacific.



Above, a 16-year old Senior so tiny she stands on a box to reach the vise. Below, a young student is drilling rivet holes.

Looking down on the airy workroom where the 16 to 18 year-olders learned and earned together.

A WORK PROGRAM IN EDUCATION

How a Group of High School Students Help Build Liberators and Get Money, School Credits, and Practical Experience in Work.

BUILDING bombers became important business this last year to 300 high school students who worked part-time for Consolidated Vultee in San Diego — even though they brought to it the gay spirit of a jam session. Peppy 16-year old girls riveted beneath turbans wrapped glamorously around soft curls. The husky boys decked themselves out in gaudy plaid shirts while running machines to turn out Liberator parts. The teen-agers worked intently, without horseplay among the boys, or giggling between girls.

Their factory jobs were made a part of their school work in a town where the labor shortage is still serious. The students received grades for the work experience course, and got one credit a semester towards graduation. Youngsters attending six high schools and two junior high schools went to school four hours a day, then boarded special busses that carried them through scenic Balboa Park to their own factory — a big building that was used in the San Diego Exposition, and sits high on a knoll in the park overlooking the ocean. In this circular, modernistic structure, the young boys and girls worked on a four-hour shift Mondays through Saturdays.

It's a pleasant place for young folks. Colorful murals decorate the walls above the machines and benches. At noon during the school term, the students lunched at a tropical-foliaged oval patio, where a bird bath overflows into a shallow pool.

The project has been so successful that, beginning with school vacation this summer, the school students are now going to work in the company's main plant, under special permission accorded by the City School Council and the War Manpower Commission. There they join the "Junior Liberators Club," and will follow a time schedule that will end the working day for most of them at 2:30 or 3:00 o'clock every afternoon.

The factory school in Balboa Park was called Department 109 on company records, and operated in conformity with procedures established for all departments in Consolidated Vultee plants. The department head had duties similar to those of a general foreman, and was held responsible for meeting production schedules on the parts which the trainees turn out. Company timekeepers, production control personnel and inspectors carried out their regular functions in the trainee department.

The high school students produced during the school term approximately 3,500 sub-assemblies per week, and worked on an estimated 40,000 sheet metal details. All production, after final inspection by a company inspector, was shipped out in special deliveries that kept the finished parts flowing into the plants. The parts were then routed to proper work stations for installation in Liberators.

The students have been paid 60 cents an hour to start, with a nickel raise every eight weeks until they received 75 cents an hour. The weekly pay checks caused no furor among the boys and girls. To most of them the money has meant war bonds, help towards a college education, or a savings account. Competition for grades, based on quality of work, seems to have come first with the youngsters, just as in the school room.

"Since turning out airplane parts is just another course in school to them, they work for grades," an instructor once explained. "The result is a high quality of work."

Absenteeism in the factory school has averaged the same as in school classes. Most students have few, if any, worries or responsibilities, and are able to work intently every day without suffering from the mental fatigue some older workers experience when they have important problems on their minds to harass them during working hours.

Our Fighter Friends

BY SERGEANT F. L. TESKE

At our Liberator Base in Italy all the crews agree on one thing: Nothing is sweeter looking on a mission than a flight of P-38s. What an escort those fighters make! The only trouble is that Liberator men, between their scrapes with ME-109s and JU-88s, seldom get close enough to the P-38 pilots to express appreciation.

But a solution to this problem was found at our own Base by the Commanding Officer of our B-24 Bomb Group, Lt. Col. Horace D. Aynesworth, of Childress, Texas. He invited the pilots of the "pea-shooters" over to a party.

Our Liberators were flying a mission that day, and the P-38s were there to escort them, so the party could only get under way after the mission had been completed. Late in the afternoon the P-38s buzzed our field, and a few minutes later were taxiing up to group headquarters. When Captain Ronald Asmead of Ottumwa, Iowa, stepped out with his P-38 men, they were immediately surrounded by a welcoming committee of Liberator pilots. Inquisitive ground crews, accustomed to working on Liberators, meanwhile surrounded the sleek P-38s to study their lines.

Then the party got under way. In an old abandoned Italian wine cellar nearby, the Liberator bomber crews and the P-38 pilots held a rally featured by entertainment from a hot jive band of a neighboring bomb group. They sang — among other things — their own version of "Pistol Packin' Mama":

Shoot that Focke-Wulf down, boys,
Shoot that Focke-Wulf down.
Pistol packin' baby,
Shoot that Focke-Wulf down.

The rest of the night was spent dancing in the Liberator Pilot's Officer Club, with plenty of feminine partners in the shape of Nurses from nearby hospitals and Red Cross girls off duty for the evening. As a result of that beginning, fighter pilots and Liberator crews in our area can now take a more personal view of each other, when they meet in their rendezvous high above the European clouds.

Red Cross girl hands doughnuts to officers of B-24 Group and P-38 Squadron.

P-38 Squadron Commander explains high points of Lightning to Liberator men.

A Lieutenant Colonel and a Major extend welcome to two Lightning pilots.

The Wing and the Group Commander enjoy jokes and food at Officers' Club.

The ATC, which now operates a 110,000-mile network of airlines around the world, and uses Liberators to carry both freight and passengers on its longest hauls, is an extraordinary development of the war. Here is the story of its First Port of Embarkation in the United States

Guest of ATC

ON the day when Colonel Hugh B. Dudley was told he was now in the hotel business, he was operating in a few hot huts for the Air Transport Command at Boca Raton, Florida, with a modest detachment of officers and enlisted men under him. His orders were to move into the Hotel Floridian down at Miami Beach without any halt in his operations, and be ready to "process" 300 men for ATC evacuation by air in two days.

Forthwith the Colonel — who was a Lieutenant Colonel then — moved some 90 truckloads of equipment and supplies overnight without batting an eyelash. The 300 men arrived to find cool sheets on the beds and hot food on the tables; and in 48 hours they had been checked for equipment, innoculations and all the minutia attending evacuation, and were being flown to the wars.

Since then the Floridian has become Port of Embarkation No. 1 for the Air Transport Command in the United States of America, and the thousands that are "processed" through the Port each month — en route to war in Liberator Express planes and other transports used by ATC — have made it necessary to add a neighboring hotel skyscraper, the Fleetwood, to the Port's facilities.

In the offices of the Caribbean Wing at West Palm Beach, they will tell you that Colonel Dudley's command is something the ATC is extremely proud of. Down at Miami Beach, on the other hand, the Colonel assures you that No. 1 is only typical of the work that ATC does habitually in its global job of putting Americans wherever they are needed in a hurry. In many ways this is true. All around the world the ATC is prepared, even in the most unlikely places, to surround its passenger-guests with extraordinary comforts, safeguards, and conveniences, which differ little whether a given traveller is an army private or a representative of the White House. The ATC, which was just three years old on May 29th of this year, has not only created a transportation system without parallel in world history, but has carried the flag of American efficiency at its every port of call.

It still remains that Major General Harold L. George, commanding ATC operations, takes honest pride in their handling at Miami Beach, and regards Port No. 1 as a model operation. It was the General himself who authored the recommendation that has made the Colonel one of the few non-flying full Colonels in the ATC.

NO. 1 is like Woolworth's on Fifth Avenue — its location alone would put the organization on its mettle. Through its portals moves a fair cross section of the world.

Today almost all of Southern Florida has become some kind of air base or adjunct thereof, due to the happy world-location of the Florida peninsula, and a very large share of our air traffic to other continents goes out of there. Dignitaries who pass through No. 1 feel that they are at

the courtesies due those in command of states and armies; and army privates, who get exactly the same courtesies, recover from their first shock to realize they will know forever after what they are fighting for, if perchance they never knew before. For the privates, particularly, No. 1 is what one high ranking staff officer characterized as "the last bright oasis on the long dark way to the greatest of all wars."

At Port No. 1 the enlisted men and junior officers who are to be flown to the war theatres are handled with as much care as if they were ambassadors and generals. Some of them are fighter crews; others are specialists who have particular skills. In a war of technical skills, technical men have value ratings not always expressed by mere rank. Even a private can sometimes outrank a general in travel priorities.

Imagine you are such an enlisted man, traveling with sealed papers. You only know you're going across. Back at your base, let's say, you have only a clerk's rating, but you have been doing quite a job in the laboratory, and suddenly one day you are routed out and shipped along to Miami. You have no idea of what will happen to you – whether you will join a group there, or somewhere else. So you feel pretty lonely, snatched from your familiar group and buddies; you're about to cross the ocean for the first time, going to war for the first time. This is it, and there's no one around even to crack a joke. You are just reporting to Embarkation Port No. 1 to await further orders; until you join some unit God knows where, you are under the military jurisdiction of the Air Transport Command.

You have a right to assume that an Embarkation Port will be another barracks. When you are dropped by jeep in front of a skyscraper hotel, and walk up to the registration desk of a hotel lobby where soft music is drifting from concealed amplifiers, you may already feel slightly dazed. It is ten o'clock at night as you show your papers to the clerk behind the counter; he calls you by name, and says your room is already waiting. When you get there, you find clean sheets and towels showing up where they should be, and reading lights, and a hot bath; notices tell you that your "processing" will start tomorrow, and after processing you may enjoy deep sea fishing, and boating on the lagoons, and swimming in the pool, and movie entertainment, and all you can eat in the mess halls. The chances are you feel more cheerful, as you crawl into bed, than you have been in days. Tomorrow things will look even better.

The enlisted man pays nothing for this service, eats the same food as the officers, and gets clean sheets and towels every day of his stay. The total daily cost to the Government for his accommodations is 82 cents; this covers all billeting charges, and the only item not included is the rent and building maintenance on two hotel structures — the Floridian and Fleetwood — which were taken over for the purpose.

Officers and civilians who pass through the port pay 50 cents a meal, no tips permitted, and a dollar for their room.

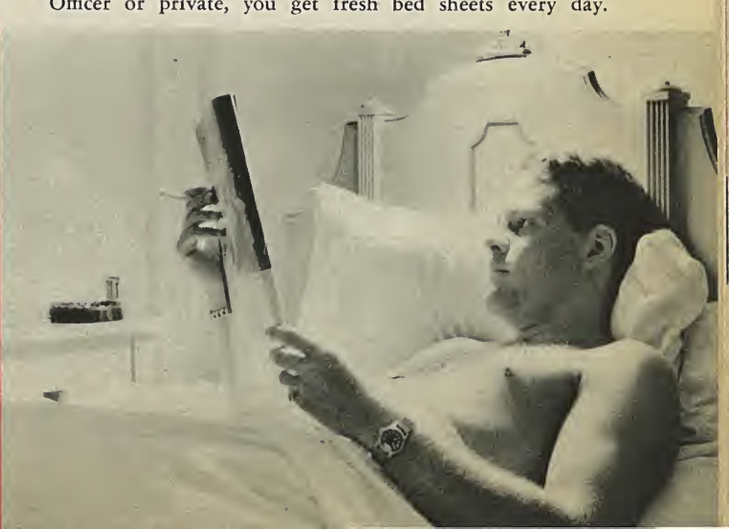
Since the maintenance allowance for enlisted men is $1.00 a day, the port makes a "profit" above its actual 82 cents cost. A big soda fountain and a soft drink bar where men can buy extras at odd hours, and a Post Exchange which does a rushing business, also provide a "profit" margin. The reinvestment of such profits to make Port No. 1 a soldier's dream of heaven is part of the legerdemain which General George likes to see his officers accomplish as routine.

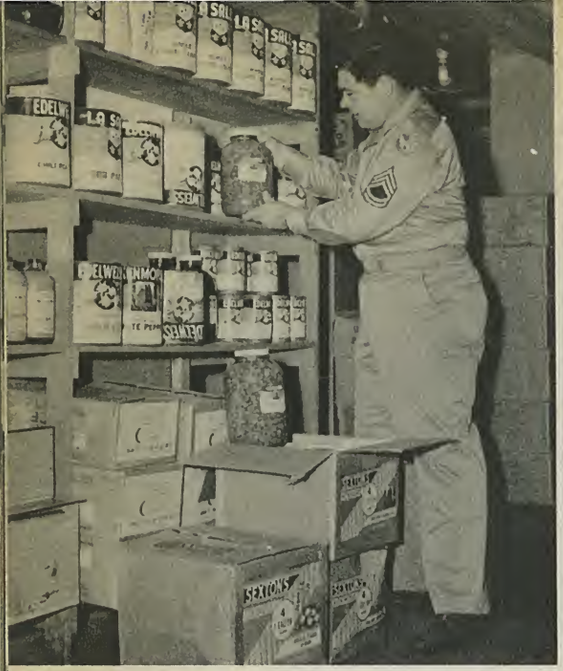
It is the "profits," for instance, which operate the fishing boats. The Colonel has gradually accumulated four boats in the yacht basin on Biscayne Bay on which his institution fronts. One was a gift from a cured yachtsman; one was retrieved from its ancient grave in the bottom of the bay, and restored by the Colonel's enthusiastic staff; one was a hull built by local school boys as a demonstration, which the Colonel's staff equipped with a reclaimed engine in spare hours; and the fourth was to some degree a purchase. In addition to free fishing tackle, the profits provide a weekly gala evening, totally cost free, on a big rented sightseeing boat which takes guests of Port No. 1 on a tour around the picturesque waterways of Miami Beach—with music, all the free beer a man can drink, and the right to bring along a girl as his guest, if he has one locally. Some of the men in the Air Forces, where good telephone numbers pass rapidly from hand to hand at bases all over the globe, manage to connect with a girl in almost every port. The Colonel says they are nice girls, too.

Out of the "profits" comes indoor entertainment, likewise. In the reading rooms, for instance, the men find four or five copies of every recent book that major reviews have proclaimed any merit in; these are not reprints, but brand new publications straight off the leading publishers' presses. All the new magazines are similarly provided, and "heavies" like Harpers and the Atlantic are as much in evidence as the pulps. On the newspaper racks are newspapers, up-to-date within transportation time, from towns and cities all over the United States. In the writing room are unlimited supplies of free stationery, with the

The Floridian faces Biscayne Bay — for most guests, home was never like this.

Officer or private, you get fresh bed sheets every day.





Many extras are added to usual Army rations.

Officers and men eat exactly identical food.

Dancing nights always include buffet supper

ATC insignia stamped thereon. In the game rooms are equipment items, like good chess boards, that are the equal of those provided in any excellent men's club. Three times a week there is a free showing of first run motion pictures. Three times a month some of the USO or other army shows come in and stage a live-talent evening. When entertainment like this palls, there is the softball diamond adjoining the Fleetwood; free equipment for playing tennis; a volley ball court.

The Colonel, asked for a description of the techniques by which all this is provided on his operating margins, is precise in his statistics:

"We now have on our resident staff nearly 500 enlisted men, a complement of officers, and almost 100 civilian employees. Most of the work has been done by enlisted men. Now we are replacing our soldier help with civilians as rapidly as possible, releasing for overseas duty all able bodied men.

"Obviously, increasing the civilian payroll will increase the operating costs; but they will still be low. We are organized and operated exactly as any other base. We have the same divisions or departments, even military police."

The Colonel graphs his operations like a corporation president. His graphs showed too much food wastage, for instance. He initiated a system of food control, and found that the savings would give the commissary leeway to buy extras like fancy salad dressings and more elaborate desserts. A visitor allowed to explore his storerooms will find whole shelves of fine foods the boys have not been used to in their usual army rations. "The fact is," says the Colonel, "that here they don't eat so much, while they are waiting around, as they did in heavy training. So we give them the benefit in trimmings."

The Colonel has a long record of success in scientific feeding. When he was called in the early 30s to help CCC with its youth training problems, in three weeks he added eight to fourteen pounds to the weight of the lean Georgia boys put under his tutelage. "I gave each a quart of milk a day," he explains. "And for the first few weeks they ate three times the army ration."

THE Post Exchange is run with as much science as the kitchens. An investigation was made to ascertain what kind of merchandise was most wanted by boys going across seas, and what they had probably been unable to buy previously. As a result, the Exchange does a business approaching $25,000 a month. One of its favored items is high-altitude fountain pens, that do not leak on air trips. An officer who paid $12.50 for his pen at the PX wrote back from India to say he's been offered $50 for it, and wouldn't sell. The Exchange can only get a limited supply of these pens each month. A rush business is done in automatic cigaret lighters, flashlight batteries, sun-glasses, watches, and Kleenex, of which the Exchange gets a special allotment. Even locker trunks are on hand for those who have excess equipment (i.e., over 65 pounds) that can't be taken on their air trips and must be shipped by water.

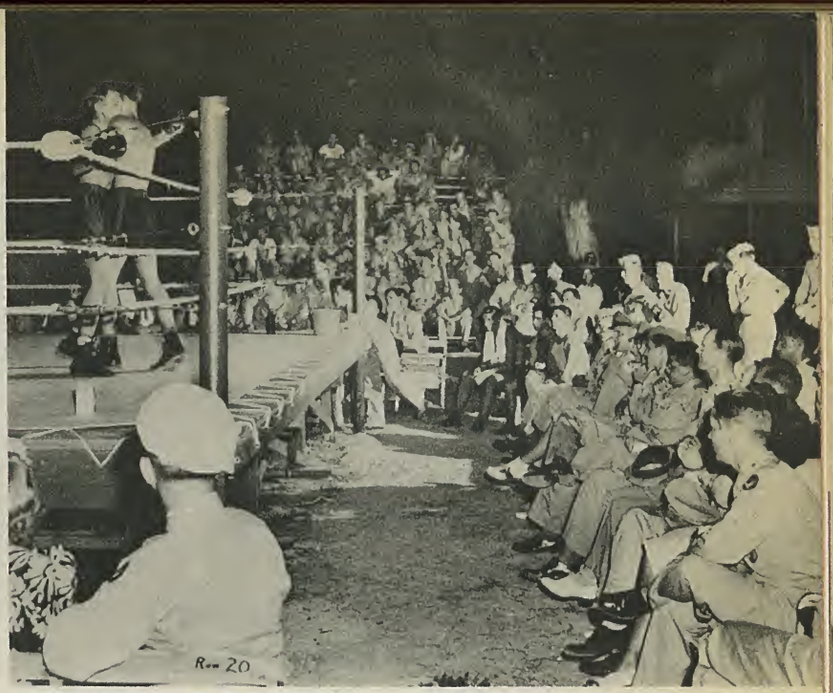
Many scheduled travelers — civilians especially — come all equipped with the wrong things, need the aid of the PX badly. Some of the experts asked to go abroad on special missions have arrived with loads of fresh pyjamas, hair tonics, and even electric irons to keep their clothes in trim, but lacked fundamentals like a raincoat. No one's baggage escapes inspection, incidentally; that is a part of military precaution.

With all his various systems of control the Colonel credits the enthusiasm of his staff for major results. He leads you down to the bakery. "The fellows discovered this themselves," he tells you. "The whole place had been used for Army training before we took over, and an enormous amount of cleaning out had to be done. One day they discovered the bakery. So why shouldn't we make our own breads and pastries? We do."

"I have only young officers. They have an enthusiasm for new-type jobs. I give them full authority in their sections, they take pride in their jobs, and they work like horses. Second, I have only officers who know the viewpoint of enlisted men. Every officer on my staff has been an enlisted man and got his commission only by going through Officers Candidate Schools. So they understand what the enlisted man wants and how he feels."

The Colonel was an enlisted man himself — says he has "held all enlisted grades from private up." He got his first military training in the cadet corps at Kansas State College — a land grant college which

The Colonel, foreground, waves good luck — fishing tackle is free.



Why visit Miami's fleshpots, when so much excitement is right at hand?

War Department has always regarded fondly because of its corps' high rating, and which today is headed by Milton Eisenhower, brother of the General. Young Dudley went into the Mexican war in 1916 as a private, came out as a first sergeant, was commissioned a second Lieutenant in 1917, emerged from the World War the youngest Captain in his regiment, the 139th Infantry, which was 17 months overseas.

In 1932 the War Department called him back on active duty as a company commander for the CCC, ended by making him a subdistrict commander in Florida over 16 camps. In 1942 he was called up again, given the rank of Major in the Air Corps, and reported for duty with the ATC — then the Air Force Ferrying Command — the day that General George arrived simultaneously in Washington to head it. The promotions have continued by the calendar; the Lieutenant Colonelcy arrived in 1942, when he was ordered to Field Duty as Deputy Commander of the 15th Ferrying Group, and his Colonel's Eagles came in March of this year.

In the upper left hand drawer of the Colonel's desk is a sheaf of letters from men who have gone through his embarkation portals, saying — in unanimous substance — that they never knew anything like ATC and its Port No. 1 could exist in the Army. There are also numerous letters from dignitaries. The Colonel is proudest of those from the soldiers.

The ATC has had long experience in making notables comfortable as it whisked them around the world. In passing through an embarkation port like Miami Beach the famous are usually under wraps — modern for incognito. At Port No. 1, there is even a special motor car for carrying such travelers as White House representatives and Ambassadors; it can hardly be recognized in traffic as an army car as it whisks them from train or plane to their hostelry, and they can spend their time there in absolute seclusion before their trans-ocean take-off, if they wish.

One General, arriving from Alaska on a mission taking him to the tropics, so enjoyed the seclusion and the comfort that he regretted ever having to leave. When he found that he would have to stay at least 14 days at the Floridian while he had his yellow fever inoculations, he was practically hilarious.

If you're a woman transient at No. 1, you live under military discipline, whether you're Lily Pons or Private Jane Jones of the WAC, Paulette Goddard or Queenie O'Toole, USO entertainer. But for the women transients, too, life is made as comfortable as possible. A Bendix washing machine, drying racks, and ironing facilities are available on the floor reserved for women transients. An experienced housekeeper is on hand to help in shopping problems. And, of course, the PX, reading rooms, cabanas at the swimming pool, and other such facilities are open to the women who are overseas bound.

The Port has even developed a GI entertainment business.

Chances are that you've heard of the soldier show called "Contact," and of the "Contact Caravan." As a radio program it broadcast from Miami Beach for 100 straight weeks. The soldier entertainers were originally attached to the Training Center at the Beach. About the time the center was due to be dissolved, "Contact" was presented in the patio of the Floridian Hotel; and in the audience was General George. The General and Colonel Dudley decided right then that the activities of "Contact" should be extended — that ATC would take it over, and send it to men on the fighting fronts to whom entertainment like this would be manna.

"Contact" has now been transferred to No. 1, to become the official overseas entertainment unit of the 1st Port of Embarkation, Caribbean Wing, Air Transport Command. It is shortly to go to the war theatres. It is meanwhile not idle. For instance, it has put on shows for the benefit of the Miami Blood Bank that literally wrung the blood out of a large percentage of Miamians. The Colonel led his own staff down, to contribute among the first. Three days a week instrumental groups from the "Contact" orchestra provide music while the enlisted men at No. 1 eat noon chow. String ensembles from the orchestra furnish music for chapel services, and boys from the organization make up a fifteen voice male choir.

THE processing that ATC travelers must undergo during their stay differs little whether they are General or private.

At Embarkation Port No. 1 every transient is put through a system that operates

The pool is a merman's dream. Girls admitted, too.

Sports? All equipment supplied.

Music as you like it. There's also an orchestra.

relentlessly behind the cushioned comfort. Dentists check all teeth; sometimes dozens of fillings are made a day. All inoculation records are checked, and the transient given any missing treatment. The base has given over 17,000 yellow fever shots, for instance; maintains a whole refrigerator full of the precious ampules, which must be used as soon as opened.

Equipment is thoroughly examined, to remedy any slips that occurred at bases up the line. When a soldier arrives with a steel helmet, for instance, it is taken away; his base evidently didn't know that these are re-issued on foreign soil and are not carried by plane, where weighty items count up.

Commandos have arrived for transport without carrying a full quota of lethal weapons; Port No. 1 has had to wrestle up such supplies as piano wire. WACs may require special haberdashery. Some soldiers prove to have four or five pairs of shoes in their pack when it is unrolled, and all sorts of extra clothing they have managed to win along the line; this is taken away despite the soldier's screaming protests that he bought the stuff — if he cannot show a receipt — and is returned to the Quartermaster for re-issue. If he does lack suitable clothes, there are stores of everything needed by the well-dressed GI in arctic and tropics, all waiting to be fitted on him.

While he is being checked and outfitted, the transient is also being "briefed." The briefing is a series of final instructions, given as lectures, to prepare him as fully as possible for his swift transplanting into a war theatre. Again, nothing is taken for granted regarding preparation at other bases; everything the soldier is supposed to know is thoroughly reviewed.

Enlisted men going through the Port get paid up to the date of their departure, and pocket their last dollars for awhile; abroad they will be paid in the currency of the country where they are stationed. Officers can get checks cashed, though under current Treasury controls all Americans are instructed to take with them no more than $50 in cash — with the rest in traveler's checks or money orders. A complete post office is ready to issue the money orders day or night. A Personal Affairs Officer of the ATC is on hand at the Port to help the traveler do anything from writing his will to getting his dog tags for identification, and revising his allotments and insurance policies. Chaplains are available at all hours for spiritual counsel. There is even a free wrapping service if a military man wants to send anything home. Nothing is overlooked that will add to the comfort of a lad who is going a long way off into a hard world.

When the "alert" comes, it means that the now-processed traveler is shortly due for dispatch. He may not leave the base. He is not allowed to make contact with the "outside" world. This notification usually happens some twelve hours before his take-off, but it may come at any time.

Many of the departures to the nearby airfield at 36th Street are in the middle of the night. No matter what time of the night a boy leaves, he gets a hot meal beforehand. The twenty-four cooks at the Port serve a series of seven meals around the clock — four of them between night and the morning.

Practically without exception, the men who go out from Embarkation Port No. 1 leave with a renewed faith in America, and the things of the spirit it stands for. The letters that pour back show that. The Colonel is right when he says that the Port is a demonstration of the ATC operations. But it is also something more.

The Colonel was standing with a visitor one evening at the dock, as several score transients got on board the sightseeing boat for their trip of free beer, music and moonlight around the harbor. The boys would call "Hi-ya, Colonel! Hi-ya, Colonel!" as they went down the dock and up the gangway, and the Colonel would grin in return. His officers say he never leaves his base of operations for weeks on end, and is on call twenty-four hours a day. Watching the youngsters leave for a lark was obviously part of his own recreation. "I never go along myself," he said. "I might cramp their style."

And then he pointed to a young Lieutenant of his staff, who was getting help assistance from a squad in shoving a piano aboard. "See that young officer?" he asked. "All his men just love him. He's the one that makes this job click."

Then the Colonel turned back toward the hotel. "Now you'll excuse me," he added. "One of my boys is in the sick ward tonight. I just want to go by and make sure he is O.K."

Portrait OF A LIBERATOR PILOT

By Master Sergeant Jules Archer

By mail from an American Air Base in New Guinea.)

LIBERATOR pilots are made of tough stuff. Take Whitlock, for instance. At the age of ten Charles Preston Whitlock lobbed a snowball through the school window and plastered the Principal. At fifteen he was a confirmed atheist, and trumpet player in his own jazz band. At nineteen, turned suddenly and deeply devout, he translated the Greek New Testament into English. At twenty-one, having become a Rutgers undergraduate, he delivered several lectures on Shakespeare to graduate classes in English Lit. At twenty-three General George C. Kenney awarded him the Silver Star for gallantry in action as a bomber pilot. At twenty-four, *Major* Whitlock, if you please, is Deputy Commander of the hell-raising "Jolly Rogers" heavy bomber unit, ace Fifth Air Force outfit in the Southwest Pacific.

The originality of his career impresses "Chil" Whitlock very little. As a self-described "philosophical pessimist," he is inclined to believe that there is nothing new under the sun, including the pattern of his own life.

Every variegation of character, thought and event in the world today, he thinks, can be found neatly recorded — literally or allegorically — in either the Bible, sum total of divine wisdom and spiritual experience, or in Shakespeare, sum total of knowledge terrestrial.

"As an obvious example," Major Whitlock explains, "take the walls of Jericho and Hitler's European fortress. Both were designed to protect evildoers from forces of liberation. Both were acclaimed as impregnable. We'll see the fall of Jericho again by Christmas of this year.

"Or, take Macbeth's forest of Birnam, where troops moved behind tree branches. Today in the Southwest Pacific troops are using the same camouflage in jungle warfare."

History, according to the Major, simply repeats old themes set down by the Bard and the Bible. Men's careers and their motivations, too, are only projections of Biblical and Shakespearean characters. Even the world of tomorrow — enthusiastically prophesied as a new, sensationally different world — is described in the same two incomparable books, if you know which pages to consult.

IF Chil, as they call him, ever gets frostbite when he lifts his four-motored Liberator, "Eager Beaver," into ice-forming altitudes, he can feel that he has good precedent. Colonel Isaac Preston, Chil's direct ancestor who served with Washington at Valley Forge, lost both his feet through frostbite. But when Chil was a boy, he certainly never intended to follow in the steps of an ancestral warrior.

In 1936, like student intellectuals all over the world inspired by the Oxford movement, Chil was an ardent pacifist. He was even President of the New Brunswick (N. J.) High School Peace Club. But in 1937, when he saw all hopes for peace crumbling with the betrayal of China, Ethiopia and Spain, he accepted war against war makers as a regrettable but necessary evil.

> *Because, even because they have seduced my people, saying, Peace; and there was no peace.*
>
> — Ezekiel 13:10

Away at camp one summer, Chil met some religious intellectuals whose conver-

sation he found stimulating. Goaded by their superior knowledge of matters ecclesiastic, the young disbeliever locked himself up with a Bible to look for contradictions he could use to prove his case for atheism. Instead he found himself impressed by the arguments for Christianity which he discovered, particularly in the Gospel of St. John.

At sunset the evening of August 3, 1937, Charles Preston Whitlock abruptly and calmly renounced atheism and embraced Christianity. By morning he accepted the fact that a new chapter in his life was at hand.

Therefore if any man be in Christ, he is a new creature: old things are passed away; behold, all things are become new.
— II Corinthians 5:17

Converted, eighteen-year-old Chil Whitlock began his college career by going to Rutgers University that autumn. Taking up Greek, he accomplished the *tour de force* of translating the complete New Testament from original Greek to English, and when he decided to major in English literature, he won such official esteem as a Shakespearean scholar that he was asked to lecture on the subject to graduate classes.

I beseech you, let his lack of years be no impediment to let him lack a reverend estimation; for I never knew so young a body with so old a head.
— Merchant of Venice
Act IV, Scene 1

While at Rutgers Chil became a Cadet Colonel in the R.O.T.C. Taking a course in Civilian Pilot Training, he won a C.A.A. pilot's license and rolled up fifty hours' civilian flying time. To fill in his spare time he daubed amateur oil paintings, made the Rutgers ski team and received his Varsity letter in swimming. He made Phi Beta Kappa, was elected President of the Rutgers Literary Society, and became Honor Graduate in English Literature.

It was about this time that the girl he had been going with for six years suddenly threw him over to marry a truck driver. Whitlock lost both interest and faith in the female of the species:

Brother, she is not worth what she doth cost the holding.
— Troilus and Cressida
Act II, Scene 2

In June, 1941, wearing an Army uniform under his cap and gown, Chil was awarded his A.B. degree in one hand, and his commission as a Second Lieutenant in the Infantry in the other. He had applied for the Ski Troops. But the Army assigned him to an armored division. He took one sample ride in a tank, immediately transferred into the Air Corps. "At least," murmurs Whitlock, "the B-24's have rugs and cushion seats."

He took his primary Air Corps training at Pine Bluff, Arkansas. A nephew of General Chennault who was instructing at Pine Bluff threw a party one night for his students. Chil enjoyed himself so thoroughly that he returned late to barracks, whereupon he was properly reamed out and confined to his room for a week. "That was the only time I was a bad boy in the Army," he says. "But it was a hell of a fine party."

Later, at Augusta, Georgia, and Barksdale, Louisiana, Whitlock rapidly unlearned all the amateur tricks he had picked up buzzing around Rutgers skies.

Colonel "Bulldog" Acheson was the colorful instructor with whom he took his first Liberator ride. Eager to spread his wings, and anticipating his orders, young Whitlock put his hand out toward the controls. "Bulldog" cracked his wrist so hard Chil thought it was fractured. "Who the hell is flying this plane?" the Colonel roared.

Ignorance is the curse of God,
Knowledge the wing wherewith we fly to heaven.
— Second Part King Henry VI
Act IV, Scene 7

In February, 1942, Whitlock won his pilot's rating; five months later the gold turned to silver on his shoulder; and by September he was ready. Trained Liberator pilot 1st Lt. Whitlock left the United States, destination unknown.

HIS unit was the "Jolly Rogers," whose twin-tail pirate insignias of skull and crossed bombs, and bold claim to be "the best damn heavy bomb unit in the world," have made them one of the most colorful Air Corps outfits in the Southwest Pacific theatre.

Chil regrets that the Jolly Rogers arrived in Hawaii too late to participate in an experience that has since become Hickam Field legend. The new General coming in to take charge of the base had arrived by plane at 3:00 A.M. He immediately ordered a full-dress inspection of all personnel, which he made personally with a flashlight, even pointing it at shoes to inspect the shine. Chests that were not out

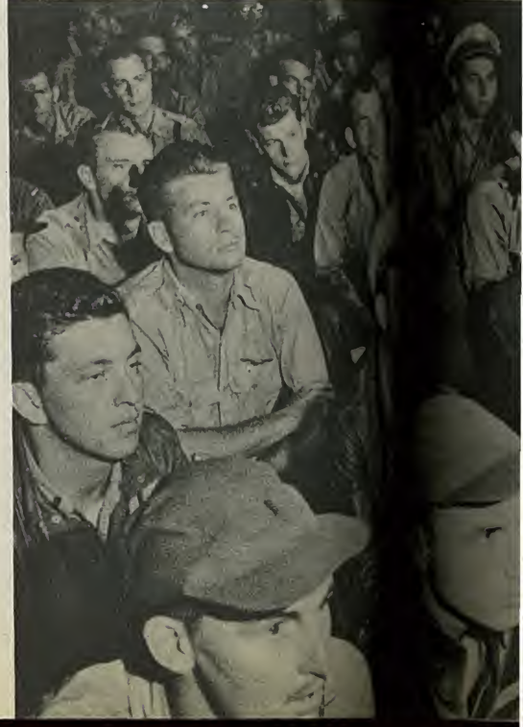
Jolly Rogers ground crews bombing up the Li

far enough were tapped by the Gener swagger stick until they expanded to pacity. "What a sight that must have be at three in the morning!" Whitlock sig

When the Jolly Rogers finally reache their Southwest Pacific combat station, Ch soon found that flying conditions differ considerably from those at home.

On one mission, in company with o other B-24's, he was forced to fly throu

Jolly Rogers crews at Rabaul, in New Br



…et, Col. Arthur Rogers, whose name they bear.

…a cumulo nimbus cloud. One of the three planes never came out of it. Whitlock's plane was coated with a ton of ice in forty-five seconds when he hit sleet and supercooled rain inside the cloud. The glass nose was completely iced over. Dropping suddenly at the rate of six thousand feet a minute caused the bombardier to rupture both eardrums. The ordeal lasted five minutes . . . longest five minutes of Chil's life.

…e shown in intense concentration at briefing.

Hast thou entered into the treasures of the snow? Or hast thou seen the treasures of the hail, which I have reserved against the time of trouble, against the day of battle and war?

— Job 38:22-23

Whitlock finally managed to dive the bomber out of the murderous cloud, and the lower altitudes melted their thick coat of ice. Chil finished the trip weaving on instruments through 16,000 foot mountain ranges at precarious altitudes of some 14,000 feet.

Whitlock won't forget one take-off he made when three engines abruptly died. He was left flying a heavy bomb load at only five hundred feet, on one engine. He quickly feathered two props, let one windmill, dropped his bomb load and hoped for the best. If the bombs had gone off, this report would be in the nature of an obituary.

With the first hazard past, Chil steered his ailing "Eager Beaver" toward the sea for a crash landing. At the last moment the dead motors sputtered and came to life. "There were no disbelievers in my crew after that," he says.

One day when the Japs were landing a large-sized force at Hollandia, New Guinea, Chil's boys were selected for the important reconnaissance mission. On their way up they were jumped by twelve Zeros. One of their engines was set on fire, top and tail turrets were put out of action, and their radio was silenced. The scrap lasted over half an hour; it cost the Zekes a full five of their twelve planes.

How art thou fallen from heaven, O Lucifer, son of the morning! how art thou cut down to the ground, which didst weaken the nations!

— Isaiah 14:12

Instead of turning back prudently and getting home on three engines, Whitlock dove his Liberator into clouds and escaped — northward. Feathering the prop of the fired engine, he flew over Hollandia, collected his vital recon photos, returned the "Eager Beaver" safely home.

General Kenney phoned the Jolly Rogers Headquarters next day to have the crew report to the air strip at once. Whitlock was to be awarded the Silver Star for conspicuous gallantry, and each of the crew would receive a D.F.C. A frantic search of the camp revealed that Chil had left to enjoy his favorite jungle sport. So an apologetic Headquarters meekly informed the General that the decoration ceremony would have to be postponed because Major Whitlock had gone swimming.

KING: No tidings of him?
PISANIO: He hath been search'd among the dead and living,
But no trace of him.

— Cymbeline, Act V, Scene 5

The day afterward, when the crew of the "Eager Beaver" was lined up at attention for the ceremony, the General smiled as he pinned a Silver Star on Whitlock's chest. "How was the water?" he inquired slyly.

WHITLOCK has been a key figure in many of the big shows in the Southwest Pacific. He played an important part in the Allied air pounding of Lae and Salamaua, was leader in the first heavy Allied attack on the Admiralty Islands, was also out in front on the early hazardous daylight raids on Wewak and Rabaul. His ship hit a destroyer bound for Buna, sank an 8,000 ton freighter in Hansa Bay. It was Chil who led the Allied blitz on Gloucester's strategic Target Hill, paving the way for the subsequent invasion. And he was strike leader for the aerial blitz that smashed the beach defenses at Saidor, which the infantry seized shortly afterward. There's an Oak Leaf Cluster on Major Whitlock's Air Medal, and he has also been recommended for the Distinguished Flying Cross.

You may relish him more in the soldier than in the scholar.

— Othello, Act II, Scene 1

Chil has proved a versatile officer for the Jolly Rogers. Before becoming Deputy Unit Commander under Lt. Col. Harry J. Bullis, he was in turn Instructor Pilot, Flight Leader, Communications Officer, Operations Officer, Squadron Adjutant and Squadron Commanding Officer.

Another job young Whitlock undertakes, with popular approval of the Jolly Rogers, is that of Assistant Chaplain. While the Chaplain is away, Chil generally preaches the sermons.

Chil's favorite relaxation, a fine library of symphonic music, accompanies him wherever he is stationed in the jungle country. While on leave in Sydney, Australia, Whitlock indulged himself in an orgy of plays and concerts. He particularly enjoyed having tea with Bernard Heinze, Conductor of the Sydney Symphony Orchestra, and a promising composer named Frank Hutch-

ens. Spending a good deal of his time studying in the Shakespeare wing of the New South Wales library, Chil also helped the Australians in the compilation of a bibliography of American Shakespearean critics. While there he did research work and some writing on a manuscript he is preparing for his M. A. thesis, "Religion of Samuel Johnson."

Thou art not for the fashion of these times,
Where none will sweat but for promotion.

— As You Like It,
Act II, Scene 3

To Whitlock's friends, who found wine, women and song more diverting on leave than the New South Wales Library, Chil was too good a target to let alone. They conspired to introduce him to a young lady whose interests in life were not precisely intellectual.

He took her to a concert one night, during which time she learned to her amazement that he neither drank nor smoked. While Chil was absorbed in the music, he hardly noticed that the affectionate young woman had slipped her hand into his. At the end of the program, as they left to go, the ardent lady made a suggestion that stood Chil's hair on end. He evaded the issue, but when he saw her home, she again extended her hospitality, and with alarming determination. Whitlock is still vague about his escape, but his friends say he had to defend himself every inch of the way to the door.

"Pity," she cries, "some favor, some remorse!"
Away he springs and hasteth to his horse.

— Venus and Adonis

SINCE war had to be, Chil is glad he has been able to see action as part of the Jolly Rogers. "They mean business and they do business," he affirms. "They take their jobs seriously, but not themselves. They're the kind of men you're glad to be with." Statistics show that the "best damn heavy bomb unit in the world" scored 320 Jap planes shot down, and 52 enemy vessels totaling 241,510 tons sunk, in their first year of combat.

Whitlock feels that no temporal solution can be a final solution for a world upset by power politics. Peace on earth, goodwill toward all men, will only be possible when a majority of the world's citizens reject personal and national selfishness, and prefer a clean conscience to the material gains of unscrupulous conduct.

Chil believes Germany will be defeated by this Christmas, Japan sometime in 1946. Although he has been offered the opportunity of returning home three times, he has refused, preferring to stay with the Jolly Rogers.

It is more than likely that his recurrent malaria will force him to return to the States before the show finishes, but until then Major Whitlock intends to stay airborne, leading combat missions along with Lt. Colonel Bullis. The two of them are the last of the old Jolly Rogers pilots.

Asked whether he thinks he isn't "pressing his luck," Whitlock answers quite sincerely, "Anyone who is a Christian and believes in the hereafter has nothing to be afraid of. And the transition from life to death for a combat pilot is too brief to be terrible."

He shall fly away as a dream and not be found.

— Job 20:8

When the war is over Major Whitlock has plans that are backed by a tidy bank account and a thousand dollars in War Bonds. First on the agenda is earning a Ph. D. at Chicago University. Afterwards a home in Andover, New Hampshire handy to ski slopes. Finally, he hopes to teach English Literature. Right now there are still the wing-mad Jolly Rogers to look after, several thousand tons of bombs still awaiting delivery to the Japs, and the vast amount of Scriptures and Shakespeare he has yet to absorb. Major Whitlock thinks his attention will be fairly well occupied for quite a while.

He hath borne himself beyond the promise of his age; doing, in the figure of a lamb, the feats of a lion: he hath, indeed, better bettered expectation, than you must expect of me to tell you how.

— Much Ado About Nothing
Act I, Scene 1

New Products of Research

RESEARCH is making enormous advances in its ability to create new products, never existing before, to answer a specific need. And the research departments which can do this work are an asset of great value both to an industrial organization and to the whole nation.

At Consolidated Vultee two wonderful new products have been recently devised to speed the job of building better airplanes. After the war, they should have many useful applications, both in industry and the home.

One of these products is a magic sort of "glue," called Metlbond, which will stick almost anything to anything. It will, for instance, attach plexi-glass to aluminum. It will bond steel, up to ¼ inch in thickness, to aluminum, even though the thermal expansion coefficients of the metals differ considerably. It will bond steel sheets to plastic surfaces, glass to glass; it will bond aluminum alloys, magnesium, steel, zinc, cadmium, fiberglass, cotton and rayon, several plastics, wood, and rubbers. The sheer strength of Metlbonded joints is approximately 3000 pounds per square inch, compared to about 1800 p.s.i. for the average riveted joints.

Metlbond is prepared in liquid, paste, and tape forms. All of them require "curing" at a temperature of 330°, and at an atmospheric pressure that varies with the form, for a number of minutes after application.

The theory of adhesion is still in an elementary state, and much territory remains to be explored. Metlbond has now been approved by the Army for use on many airplane parts, and the expansion of its use will proceed as fast as necessary facilities can be developed.

A second new product of Consolidated Vultee research is an amazing synthetic rubber compound called "Galco." It was first developed to eliminate leaks in fuel tanks, which have grounded many a plane. The product is named for its originator, T. J. Galvin, chief chemist of Consolidated Vultee. Galco will withstand temperatures ranging from 112° to −70° F. It is impervious to most solvents. Liquefied, it can be applied like paint to the inside walls of a fuel tank. It seals all seams, prevents leaks, adheres readily to aluminum alloy surfaces. It has very high resistance to aromatic fuels, variation in air pressures, and vibration. It is to be made available to all aircraft manufacturers as soon as it can be produced in large quantities, and following the war should be useful in many other fields.

To help stimulate the sale of War Bonds, Consolidated Vultee prepared the display pictured here, and is offering it to banks without charge — in advertisements like this — which have appeared in banking and finance magazines. The response has been most gratifying.

For your bank—

A STIRRING REMINDER TO BUY WAR BONDS

HERE'S YOUR CHANCE to get an attractive, hard-hitting War Bond salesman — at no salary!

To assist the sale of War Bonds through banks, Consolidated Vultee Aircraft Corporation offers an arresting display piece for your bank.

It briefly sketches the story of war aviation in a picture display. A row of illuminated color-photos show what War Bonds are paying for today, in fighting and transport airplanes, from "Flying Jeeps" to Leviathans of the air!

The air-age map on top shows, in fluorescent plastic, the air routes of the peacetime world to come. And the dominating theme of the whole display is the urgent necessity for buying more and more War Bonds.

Packed in a single crate this hard-hitting piece for lobby or window can be obtained for your bank simply by paying a nominal shipping charge, not to exceed $5.00. The display measures about 4′ x 4′ x 1′.

CONSOLIDATED VULTEE AIRCRAFT CORPORATION
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THE LIBERATOR

Plane Talk

SEPTEMBER · 1944

...dits — Catalina in Haiti

Why We Need Airpower for Peace · Demobilizing Our Aircraft Industry
Liberator Men in China · Medical Brief for World Travellers · Hot Stuff for Liberators

Plane Talk

If you wish to share your copy of Plane Talk when you are through reading it, you may send it to a friend for 6¢. The simplest way of mailing is to slit a business-size envelope at both ends, roll up the magazine in it, seal and address and put on 6¢ in stamps.

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UNTIL *this month's issue we have used few drawings in Plane Talk. Photography has been reporting today's war with harsher clarity than usually attained by the soft brushes of the artists.*

But Lieut. (j.g.) Dick Reeves, USNR, whose picture at the top of this page was taken in China at an Army-Navy exhibit of his art, has something important to say with his watercolors. You will find some examples beginning on Page 8, with Fred Barton's article. The Lieutenant writes: "It may be strange that a Navy man should be serving in China, but here I am, with The Army's Fourteenth Air Force. Practically all my spare hours (not too many) are spent in sketching — a holdover from civilian days when I batted around in commercial art in New York. Meeting Fred has given me a chance to get back into illustration."

The front cover is the official work of another Navy artist, Lieutenant Albert K. Murray, who shows us a Catalina at the Pan-American field, Port-Au-Prince, Haiti. The back cover is an official Navy kodachrome, showing Catalina crewmen in the Pacific.

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Edited by Hill and Knowlton for the Consolidated Vultee Aircraft Corporation and published every other month. Text and pictures have been cleared for publication with Government authorities. Text of any article contained in the magazine may be reprinted with or without credit to Plane Talk. Copies of most pictures, except those credited to commercial news agencies, can be made available to editors upon request. While manuscripts are not solicited, first hand accounts of experiences by men in the air forces at the fronts will be given careful consideration. All correspondence and address changes should be addressed to the office of Hill and Knowlton, Room 3301, 350 Fifth Avenue, New York 1, New York.

WHY WE NEED AIRPOWER FOR PEACE

INS Photo

American airmen in control tower on field in Britain watch Liberators taking off to put another dent in Germany's ambition to rule the world.

BY EUGENE E. WILSON

Chairman of the Board of Governors, Aeronautical Chamber of Commerce of America.

Mr. Wilson, who is the Vice-Chairman of United Aircraft, tells how airpower will act as America's peace insurance.

WITH the coming of peace, some may protest that we cannot afford to maintain our Air Power. This objection loses sight of one fact: Air Power, properly administered, need not be a burden upon our people. Far from tending to depress our standard of living, it can become a profitable investment. And it is completely vital to our security. As a guarantor of that security, it is the cheapest insurance we can buy.

This has been becoming clearer ever since World War I. The first important stage in the growth of American Air Power was during that war, when development of aviation was thrust on us by external forces.

When we entered the war in April, 1917, we were without military airplanes, or even designs for them. We borrowed liberally from the designs of our Allies. We worked hard to produce designs of our own. We moved energetically to produce military aircraft by American volume production methods. Despite all this, few American air-

Five Marines wounded in Saipan walk up a ramp from the great Coronado flying boat which brought them swiftly to Honolulu for hospitali

planes ever got to combat in World War I.

Similarly, we were not prepared for the armistice which came in November, 1918 — we had no adequate plans for terminating war contracts, and we had no definite program or facilities for disposition of surplus goods and plants. The result came close to a debacle. Many aircraft companies failed. And those which escaped collapse were producing only a few small orders.

That state of affairs lasted until around 1925. In that year the vigorous criticisms of Brig. Gen. William E. Mitchell, plus a mounting public demand for action, resulted in the creation of the "Morrow Board" by President Coolidge. On this Board sat representatives of the armed forces, the aeronautical engineering profession, the Congress, and the public.

The Board concluded that our national security required a strong air force — that this air force must have at its base a sound private aviation industry — and that technological and manufacturing progress in this industry should be made possible by an extended program of government orders for planes. The recommendations of this board were embodied in the Air Corps Act of 1926, under which an Assistant Secretary for Air was appointed in the Departments of War, Navy and Commerce.

The Morrow Board and its recommendations might well have started the United States on the road to real air power. Unfortunately, not all its recommendations were followed. Some were. Sometimes they were followed consistently, and sometimes intermittently. But enough government orders did get placed to enable America's aircraft industry to be technologically prepared for World War II. We had the designs, if not the plants and production.

Fortunately, pre-war orders from nations which were later to become our Allies enabled us to take these designs of ours, develop our production, and build up our plants. So when America entered World War II, we were in a position to supply aircraft to our Allies, instead of borrowing from them. And at the same time we could furnish planes for the air forces of our own nation, and create the power that has given us control of the air and sea lanes.

It is inconceivable that we should now or in the future abandon the control we have secured, and through indifference allow another nation or nations to outstrip us and eventually dominate us.

In the light of what has been accomplished in aircraft manufacture, we can now foresee huge bombers able to attack an objective half way around the globe, and to return non-stop. In the next war such bombers will not allow us the few hours of grace which follow a declaration of war. Air power will strike like lightning. Announcements of hostilities will come later. We, ourselves, must have air power to discourage and forestall such sudden attacks.

AIR power, properly understood and used, is a close correlative to sea power.

Captain Mahan's great work, "The Influence of Sea Power Upon History," showed the vital importance of sea power both in waging war, and in promoting prosperity during peace. American and Br sea power have worked cooperatively years, extending the constructive bene a peaceful interchange of products ideas to all the world.

Three times during the past 25 years beneficent control of the seas has been lenged by the enemies of democracy— by the Germans with submarines, and cently by the Japanese with naval Power. The challenge has each time mastered.

In World War II Allied air power been a vital ally of greatly expanded forces in meeting these menaces to our power. American aviation — now pre inent in operation, engineering, desig production — will hereafter always vital instrument in maintaining freed the seas.

Air power is wholly comparable power in its organization. Sea power instance, springs from five basic ele the Navy, the Merchant Marine, the building industry, strategic bases, national seafaring tradition. Air Pow pends on comparable elements, inclu Army and Navy air forces, commerc transport, private air transportation, th craft manufacturing industry, strate bases, and an air-minded public.

While combat air power has gott glory in the present war, we must re ber that American transport has al veloped tremendously its utility as weapon. Private domestic airlines h panded to operate vast overseas s under contracts with the Air Tra

Command. The Army and Navy Air Transport Commands, by serving distant fronts in this global war, have made possible many complex operations.

Rapid transportation of troops and key men has been effected — needed materials have been rushed to all fronts — war necessities have been flown back to our factories — wounded have been brought back to this country for proper treatment.

Even the personal type airplane has made a great contribution by serving as eyes for the ground forces, as the transportation vehicle for combat officers, and as an aerial ambulance.

The success of the invasion of Europe has hinged as much as upon any other factor on the ability of the air forces — working and fighting in conjunction with other services — to assure us freedom of communications on land, sea and in the air, and to deny that freedom to the enemy.

We should never heedlessly destroy our ability to produce such a potent weapon. When peace comes, the conservation of the assets which comprise our air power of today will pay dividends to the nation for generations to come.

What are these assets?

They are not only the planes which have bombed, strafed, torpedoed, and shot out of the skies the enemy aircraft in combat.More than that, they are the "know-how" which made these planes possible. The backbone of air power is the aircraft industry, and technological progress is its life.

But unless positive measures are taken — and taken soon — to retain a strong nucleus of these national assets, the American aircraft manufacturing industry could be rendered ineffective in its future ability to serve the American people. The industry believes — and believes unselfishly — that its survival as a strong entity is a matter of the whole national interest.

There is one fundamental difference between aircraft plants and many other industrial plants that temporarily entered war production. Most of the plants designed for making civilian goods can reconvert, when the war ends, to their normal activities.

The automobile industry, for example, will go back to the production of motor cars, with a huge pent-up demand waiting. But aircraft manufacturers are not in this fortunate position. And if America's need for continuing Air Power is ignored, its aircraft manufacturing companies will face a diminishing demand that might well mean deterioration of this vital national asset.

The American people and the aircraft industry have a long-range partnership in planning the future of domestic and international air transport. An historic and, for the public, a profitable precedent for such a partnership can be found in the development of railroad and automobile transportation, with their great benefits to the nation and to individuals.

An investment in air power will pay this country rich dividends in future security, economic progress, employment, and in the broad advance of our civilization. It is to be hoped our people understand this. For the future of the industry is in their hands. One of the most immediate needs, perhaps, is that the people's Congress restate, as our national policy, the need of advancing technological development in aviation through competitive private industry. This is an essential first step in planning to keep the peace that will follow the war.

We can keep this coming peace by having adequate air forces of such strength and in such state of readiness as to preclude — together with other branches of the armed services —a successful assault on our country or its possessions. Strength means not only large air forces — it also means superior aircraft.

We can keep the peace by facilitating the orderly and economic expansion of domestic and international air transport and of private, or personal flying.

We can keep it by training the youth of the country to understand the air as a vast new world for transportation, and to fly the airplanes which link that world together.

We can keep it — finally — only on the basis of a strong aircraft industry.

For to maintain adequate air forces, we must constantly advance the design of all aircraft and produce new designs. We must improve our engines and our instruments. We must provide for research. We must improve our materials and simplify our manufacturing procedures. We must continue to employ as many as possible of our thousands upon thousands of skilled workers, so that our nation will not lose their invaluable experience in the creation of air power.

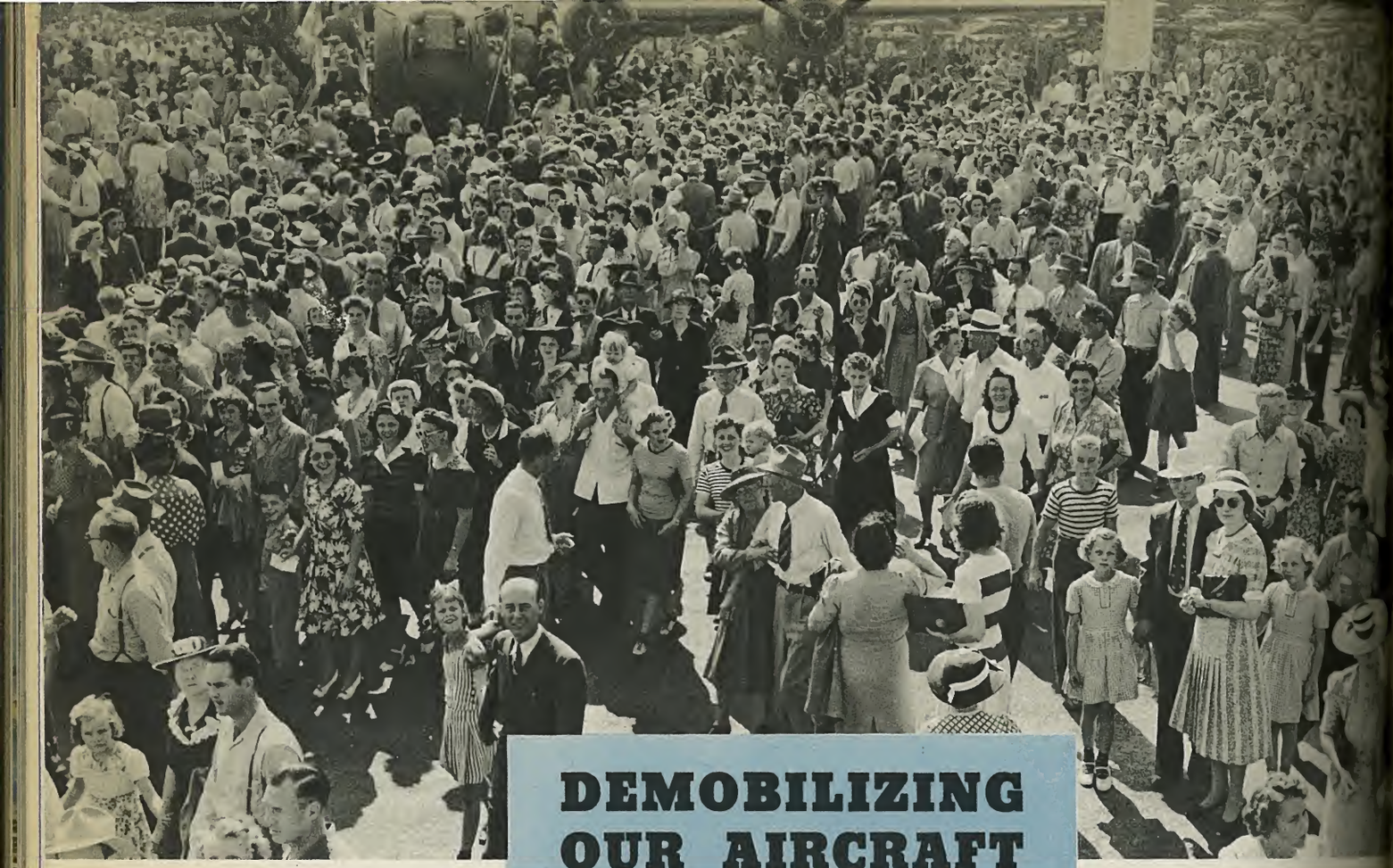
Finally, of course, we must train combat crews and ground personnel; we must extend our meteorological and navigational facilities; we must increase our landing facilities, and extend our runways.

All of this will, of course, cost money. Every cent spent will mean employment, new conveniences in travelling for the masses, new development for our cities and countryside, new closeness in contact with other peoples all over the world. If the expenditure gave no return at all, it would still be the cheapest possible insurance against recurring wars, with their horrible loss of life, tremendous costs and ultimate lowering of living standards.

Actually, the money spent will bring the nation security, power, and wealth which could not otherwise be had at any price.

U.S. Navy Photo

Nazi submarine being blasted by depth charges from Navy Liberator (PB4Y) in the South Atlantic.



DEMOBILIZING OUR AIRCRAFT INDUSTRY

BY HARRY WOODHEAD

Member of the Board of Governors, Aeronautical Chamber of Commerce of America

Mr. Woodhead, the President of Consolidated Vultee, urges a common-sense program.

THE problem of employment will be foremost in the minds of all Americans when this war ends. We can store excess machinery, but we cannot store surplus human beings.

There are about 2,100,000 aircraft workers. Of those, 1,112,650 work for basic aircraft manufacturers, about a million work for 162,366 sub-contractors and vendors.

The aircraft industry, today producing three-quarters as much as all the United States industries together in 1940, is a major part of the national economy. This economy must prepare itself to stand the shock of transitional employment for the greater part of 18,000,000 people engaged directly and indirectly in war production, plus 11,000,000 members of the armed forces, and nearly 2,000,000 others in war-related government services.

Avoidance of a violent economic adjustment for a majority of 2,100,000 aircraft workers will greatly benefit the nation.

The aircraft industry wants full employment for everybody. But there will be a difficult transition period before this aim can be achieved. Demobilization will be a national problem.

The industry believes adequate unemployment insurance to be an essential for orderly manpower demobilization and re-employment. As part of the national economy, the aircraft industry will be glad to share this burden with other industries.

Many of the workers presently employed on aircraft have had no previous industrial experience, have been trained for their specific jobs by the aircraft industry.

Re-training will therefore be necessary for many of those who go into other industries. We believe that the new employer or suitable educational agencies should assume the responsibility of training.

In many aircraft plants it has been necessary to bring workers from great distances. We endorse that part of the George-Murray bill providing transportation of these workers to other jobs or back to their bona fide residences at government expense.

War contractors and government employment offices should collaborate to assist employes in finding new employment opportunities quickly. This demobilization problem is not that of the aircraft industry alone, but of the entire national economy as a whole. The aircraft industry expanded its production of war weapons at the government's request.

The financial position of the aircraft industry aggravates its problems in converting from wartime to peacetime operations. Only a few years ago, the industry ranked a lowly 44th in importance to the national economy. It has now been rocketed out of all proportion to its former status. Its postwar outlook is for a return to the status of relatively small business.

Had aircraft manufacture been able to enjoy a normal peacetime growth, aircraft makers gradually would have acquired financial resources necessary to sustain increased volume. But our tremendous expansion has taken place under the demands

The Liberator bomber (B-24), shown at right, will soon have a bigger brother in action — a much heavier new super-bomber called the B-32, which has been announced in production by the War Department. Full details on this newest Consolidated Vultee plane, which has been reported in production at company plants in San Diego and Fort Worth, remain restricted by war requirements.

of war. Working capital has increased, but under wartime controls has by no means kept pace with responsibilities and obligations imposed by a greatly expanded production.

The rate of net profits on sales volumes in aircraft is the lowest of any industry engaged in war production. In 1943, the percentage of net income to sales for 24 major aircraft and parts manufacturers was 1.8, according to the National City Bank of New York.

Following is that bank's comparison of war industry profits:

Net Profits on Sales, 1943

Non-Ferrous Metals	9.0%
Petroleum Products	6.8%
Automobile (including aircraft sales)	3.2%
Railway Equipment	3.1%
Iron & Steel Industry	2.8%
Aircraft and Parts	1.8%

The profits reported by the aircraft manufacturers during the war period are to a large extent bookkeeping figures. The ultimate profits, if any, of the industry during the war can only be determined when all final settlements have been made. A very substantial part of the bookkeeping profits are still in the business, largely in the form of inventories and other properties which will be subject to drastic shrinkage in values. Only a small part has been paid out in dividends. In spite of this very conservative practice, working capital is meager in relation to the obligations of the business. It is safe to say that the entire net current assets of the industry would not equal one month's operating costs at present production rates.

The industry, while eager to do its full share during the conversion period, may have difficulty in meeting its present obligations, to say nothing of assuming additional burdens.

THE principles set forth in the Murray Contract Termination Act are sound and workable, if they are properly administered.

A planned and orderly termination plan must certainly prevent precipitous and continued wholesale unemployment, and should provide employment in non-war industries in proportion to decreased employment in war industries.

"Many of the workers presently employed on aircraft had no previous industrial experience."

The industry believes that, once the need for given types of aircraft and equipment ends, contracts should be terminated promptly. This is sound policy, both from the taxpayer's standpoint and from the industry's point of view. We don't want to produce planes to fill warehouses.

But termination must be orderly and planned to assure the uninterrupted continuation of remaining government orders. If so conducted, it will permit continuation of planes of new design, whether in production or projected — if in the opinion

"Postwar re-training will be necessary for many of those who go into other industrial jobs."

of the Army or Navy they are needed for the maintenance of air power. It will permit continuation of development of experimental types which will contribute to advances in the sciences. It would provide for complete termination of types of which there are excess quantities, and of types which are no longer of tactical value.

It is necessary to continue and extend coordination between Army and Navy cutback programs to the *fullest* extent. If a program is to be decreased by one branch of the service, it might prove that the other would have business to fill up the manufacturing facilities so released without serious interruption of production.

The Army and Navy not only should be in accord on their programs, but should continue close contact with other government agencies and the aircraft manufacturers. Thus, when cutbacks appear probable, these agencies and the manufacturers will have the maximum possible time to adjust their schedules.

What the industry needs now is the same unity of planning and administration applied to demobilization as the Aircraft Production Board brought to production scheduling.

Many interrelated and, in some cases, conflicting facts need to be considered before a just decision can be made on cutbacks. The over-riding consideration should be the safeguarding of the creative design staffs of the pioneer aircraft companies. Some major factors which should be taken into consideration include the fact that the aircraft industry has a relatively small postwar market awaiting it. Aircraft cutbacks should, therefore, be effective first for those temporary aircraft manufacturers such as the automobile industry, which have postwar markets waiting for them.

Furthermore, problems of the creator of the original design should be given consideration in the decision as to which manufacturer is going to be cut back first — the licensee or the basic manufacturer.

Obviously, orders for aircraft that are becoming obsolete should be cut back before orders for aircraft of more advanced design and of greater tactical usefulness.

The primary consideration for all cutbacks during the war has been and should be the earliest possible determination as to how many airplanes of each model will be required by the Army and Navy.

The aircraft manufacturing cycle, from raw material to finished work, is from 60 to 120 days. Unless the government gives cutback notice to the manufacturers at least that far in advance, it will receive only semi-finished parts of indeterminate value and with attendant contract settlement problems. Such 60 to 120 day advance notice will give the government complete aircraft, instead of partially processed materials, and miscellaneous parts which may or may not be usable. In the long run this should prove sound economy for the government.

It is the policy of the aircraft industry to give advance notice to employes of any cutback which may cause a reduction in manpower. Employes should naturally be advised by the manufacturer as soon as revised personnel requirements can be computed. The speed with which the government notifies the employer of cutbacks is thus of vital importance to our workers personally. If advance notice is inadequate, many workers may return immediately to peacetime pursuits and be permanently lost to essential war industry. This loss may go up to 80 per cent of all women workers. If adequate notice is given, half of them can be saved for essential industry.

It is important that no statement whatever be released before it is definite and can be stated clearly. Uncertainties are sure to destroy morale and cause disruption of the production process.

Cutbacks should be made in a manner to avoid interference with future production of types of aircraft still in demand by the armed forces. An example will show the complexity of the problem. There are at present three manufacturers producing a certain type of bomber. One of these three manufacturers has a new model coming in to replace the one presently produced. If this manufacturer's production were to be cut, labor would leave the area of production and would not be available for the new model except at great expense of money, time and efficiency. In this specific case, the local manpower situation should have a decisive weight.

THE industry is laboring today under a major handicap in all its planning activities — namely, the lack of any information on the size of the postwar air force of the United States, and the nation's technological program for aviation development. While determination of the former may necessitate awaiting world developments, the latter certainly can be determined now. Without such information, all planning — both for military and for civil aviation — lacks a sound basis. Preparation and release of such information is an essential prerequisite to industry planning.

Civilian aircraft manufacture should be started at the earliest possible moment which will not interfere with military needs. Each company operating a government factory should be given an opportunity to buy or lease the factory at reasonable terms for use when the war ends. If, after a reasonable period of time, the manufacturer has not made arrangements for using the government factory, the government should then be free to dispose of it to others. If aircraft factories cannot be used by either the original occupant or others, the factories, if suitable, should be kept under private management as stand-by plants for defense purposes. Aircraft factories should be available for use by their present occupants as warehouses for surplus materials acquired by the government as a result of contract terminations. Under no circumstances should the plants be operated by the government.

After the war, the government will own many different types of aircraft for which it will have no use. These aircraft will be in all parts of the world. They will be at different conditions varying from new to badly worn. The policies of disposal for these aircraft are of major importance to the future of the industry.

The industry commends the Harvard Business School on its excellent report entitled "Disposal of Surplus Aircraft and Major Components Thereof." It heartily endorses many of the principles which the report sets forth.

It is the theme of the report that surplus aircraft constitute a major asset that can be used to promote production and employment in the postwar aircraft industry by broadening the demand, enlarging the replacement market, and creating overhaul and sales work.

The industry appreciates the opportunity for employment created by the need for conversion of military aircraft, as well as overhauling and repair of these aircraft to make them of commercial value. How-

ever, the employment furnished by this conversion process will maintain only a comparatively small number of people in the factories of the design originators. This business will certainly not maintain sufficient numbers of engineers, supervisory and management personnel, and workers, to assure the survival of the industry, or the continuation of adequate development and research.

Policies regarding disposal should be determined by one central government disposal agency to be created by legislative action. This would avoid duplication of effort, confusion and possible interagency competition.

Planes useful only for military purposes fall under two categories: combat aircraft which may be unsuitable for further use and should be scrapped; and combat aircraft suitable for further use which can be sold, leased or bartered to friendly foreign nations.

In the disposal of planes useful only for military purposes, the Air Forces and the State Department should have a veto power over any action deemed adverse to military security.

Overhaul and maintenance prior to delivery should be under direct supervision of a qualified aircraft manufacturer.

This is most important in order to insure buyers of the high standard of operation and efficiency of aircraft of American manufacture — and to maintain the outstanding reputation of American airplanes.

Planes primarily useful for scheduled transport operations should be disposed of on a commercial basis, and no price favors should be shown in the disposal of such surplus transport planes. The sale of the planes should not be made the instrument of a subsidy.

Wherever practicable, sales should be made through the manufacturers who originated the design, and overhaul and reconversion should be made only by qualified manufacturers. Because the national interest requires that the United States maintain the strongest possible manufacturing and transport industries, the judicious release of surplus aircraft and parts is a vital matter. Great care must be exercised to assure continuance of design, development and market. Manufacturers are clearly dependent on a sound transport industry.

Although it may not be practical to establish, at this time, and without consideration of many factors, whether disposal should be by sale or lease, care must be taken to assure that control is provided to eliminate the possibility of pressure developing in later years to continue operation of wartime planes. With this consideration, leasing seems to provide the best control in most cases, if limited to two or three years.

Delivering mail to a Liberator crew at a base in Italy. *AAF Photo*

In the disposal of surplus military aircraft which are closely akin to standard civil types, such as small liaison planes, care should be taken that there is no wholesale disposal to brokers or speculators, who might hold these planes over the market for several years.

The disposal of primary, basic and advanced trainers in civil markets, which has been proposed, raises a special problem. Such aircraft have been built to military specifications for military training purposes; they are designed for military use only, and are not suited for use by civilian purchasers for civilian flight training.

The industry therefore does not agree with the Harvard Business School report that such trainers should be sold at a nominal price. Such surplus military aircraft should be given to schools and colleges for military training only.

We cannot expect to have adequate Air Forces, with trained pilots, navigators, and mechanics, unless we offer opportunity to every able-bodied college student to get such training. The Civilian Pilot Training Program, later the War Training Service, made a remarkable contribution to the Air Forces in the emergency, and the industry strongly recommends the continuation of such a program in our colleges and universities.

All government-owned air fields not required for military purposes should be made available promptly for commercial or personal flying use at nominal cost to the states, counties or cities.

The aircraft industry should already be planning on the type of products which it hopes to manufacture at the end of the war. In order that the nation may have a strong and virile postwar aircraft industry, the government should *now permit and encourage* companies to use a part of their engineering, tooling and manufacturing facilities for the development of civilian aircraft.

As long as there is no interference with the war effort, it is undoubtedly to the benefit of the country as a whole to have all opportunities for postwar employment prepared for in advance, so that production and employment may start promptly when the war ends. Domestic and foreign sales markets should then be opened to free private competition, subject, of course, to national security requirements.

Chinese traffic cop.

Liberator Men in China

Here, in text by Fred B. Barton and water-colors by Lieut. (j.g.) Richard S. Reeves, USNR, is news from the Far East.

Via Air Mail

IT is possible to fight the war in China and rarely see or speak to any Chinese. If you're the type of GI or officer who confines himself to "Here, boy, a second cup of coffee," you will find others just like yourself, and plenty of them.

If you go deeper and discover that all Chinese do *not* look alike, you can call out "Tyrone, where are my egg-ess?" — eggs being pronounced as two syllables in both India and China. Or perhaps your Chinese waiter will have been re-named Boris, after you-know-who; or Joe E. Brown. One U. S. messhall has a China boy who answers to the name of Mortimer Snerd.

In China you live in a barracks built by the Chinese. The floors are wood and are swept with hearth-brooms and then mopped. The walls are of mud-brick. The roof is tile, and under China's severe rains the roofs have been known to leak. You have occasional hot water for your shave and shower. A modest Chic Sale is a few muddy rods away.

The food is Chinese-cooked and is supervised by GI mess sergeants and watched over by our Army veterinarians. It is neither very bad nor very good: generally it is merely monotonous. You don't get much to eat between meals. An occasional candy bar at your PX, flown over the Hump of mountains from India and carried by boat or plane all the way from the States. A mid-morning cup of coffee you can get sometimes: price about a dime U. S., or $20 Chinese.

A $50 sack of peanuts — that sum is worth about a quarter in U. S. currency — is to be had. But the peanuts are pretty small. Chinese peanut brittle, however, is not too bad.

Anything from home is a treat. Catsup, jelly, jam, canned baked beans — anything. The butter is Army stuff, guaranteed spoil-proof and melt-proof. Unfortunately it tastes a lot like axle-grease. Most of all, you miss milk. This powdered stuff is chalky and tasteless, and the taste of the queer native water, which is boiled 45 minutes and then chlorinated, comes up through it and you don't like it. Every American overseas is homesick for Mother's cooking. But most of all he is homesick for a glass of clean, creamy milk.

Manpower is scarce overseas and so native labor is brought in to do all manner of military jobs. It is a neighborly gesture, too, to employ Chinese coolies. There are millions of them. You see them everywhere. They carve away a hummock and move the dirt in flat baskets supported from a shoulder-bar, a spoonful at a time — but within a matter of days a new area is level and drained and graded. They carry gravel with their shoulder-bars, and whenever an ambitious GI challenges the effectiveness of their work he is surprised to find he probably can't even lift the load, let alone carry

it. They bring the charcoal that is China's fuel; they carry farm produce long miles to market; four of them can carry a heavy log coffin, or an automobile engine, or any load you can mention.

Yellow-skinned, slant-eyed, bare-legged and foreign they undoubtedly are. You don't speak their language. Yet you don't need to regard them as strangers. They are quick to smile: not the insincere and mechanical smile of the Jap, but a warm smile from the heart. They find Americans understandable, sure of their own minds, and democratic. A universal language has sprung up: "Ding-how," very good, hello. Ding-how gets you through the day. Now and then, for variety, you say No to something. For that you need "Boo-how": bad. That gets you by.

A universal language has sprung up: "Ding-how" gets you through the day.

When you go shopping you may or may not buy all manner of souvenirs. Staff Sergeant Edward A. Smith of Dearborn, Michigan, radio operator on a B-24, who is a 23-year old youngster taking his first trip abroad, manages to carry his family and his girl friends in his mind whenever he shops. He buys all manner of knives, wooden spoons, silk handkerchiefs and other items to mail home. He had a lot of fun shopping in India, and just now is tackling the Chinese markets.

Lieutenant Edward L. Brawner, a pilot from Dallas who is 25 and single, has had a lot of fun cashing American money into Chinese. His only previous foreign travel had been to Mexico, where for $1.45 American he received five Mexican dollars. In China for each U. S. dollar (called "gold") he can get about 180 Chinese National dollars, called CN, and likes the feeling of being wealthy. If you get your money in 100 CN notes it isn't so bad — you just bundle them into thousands and stuff them in your pocket. If the street peddler or restaurateur who sells you the CN hands you 10 CN notes, a few American dollars make a wad huge enough to fill a paper bag.

Prices are high. When you and a shopkeeper bargain and you can't understand his price, he sometimes writes out a figure for you. Also he counts out the price — several hundred CN it will be. A bottle of your favorite American fountain pen ink will cost you anywhere from $1,000 to $2,500 Chinese — and you either pay him or do without. Commodities of all kinds are scarce in China, and prices are mountainous.

Brawner tried to buy some U.S. magazines in India. Most of them cost five or six times their usual price and were issues he had read six months before leaving the States. In China his greatest amazement has been the native Chinese villages, with about 2,000 people living in one house, as he describes it.

Lieutenant Fred J. Bronowicz, navigator from New York City, is another one who is fascinated and perhaps a bit frightened by China's prices. You can sell almost anything, and at incredible profit. A used pair of trousers is worth about $20 American. You can sell a carton of American cigarets for $10 gold. But don't do it! The Army has strict laws against selling any items you buy at your PX. And there is a stiff fine and further penalties if you get caught.

As a visiting fireman in any country, you like the privilege of spending your own money and eating what you want and where you want it. The Army's doctors very wisely encourage this, but they demand the cooperation of whatever eating places are clean and safe to eat at. You may, if you wish, drink unsweetened tea and eat chow mein with chop sticks at a native restaurant that is "in bounds to American troops." Or you can get a good steak and French fried potatoes. You will eat only cooked foods: you drink only boiled water. Anything else is not safe. And despite the inoculations given to you every six months for Chinese typhoid, Chinese typhus, Chinese cholera and Chinese smallpox, you have no desire to tempt fate by eating the available raw fruits — small peaches and occasionally an abused little green banana, and tiny tomatoes. Dysentery and 99 variations of diarrhoea are a real menace overseas. An American not only enjoys safeguards such as other nations seldom enjoy — he is dependent on them, for he has no built-up resistance to these germs. Even soap is expensive and lacking in potency in Asiatic lands.

You'll eat in town now and then, of course, and you'll taste the native mulberry wine and cherry brandy. China has no beer. Then you will understand perhaps why more than one man has spent 17 months overseas but has been to town for a Chinese meal only three times in that nearly year-and-a-half.

An American Army camp after all is a world in itself. You get your mail, your magazines, your movies three nights a week, your game of bridge or casino, perhaps even a radio. And after all, fighting a war is constant hard work. One Liberator pilot, for example, has flown 115 trips over the Hump and flown 27 missions over the target, and that is careful, painstaking labor.

China is a country of 450 million people: a country of 21 separate provinces, and

Shark-nosed Liberator escorts.

many mountains, and a variety of dialects. In some areas there are bands of outlaws who support themselves by a sort of polite brigandage. If you have to bail out, it makes a lot of difference whether you light in occupied or unoccupied China.

Adventure caught up with Lieutenant Clarence L. MacDonald, bombardier, 23, single, of Connellsville, Pennsylvania one rainy June evening. Before he finished he had met more Chinese, and in new and stranger ways, than he and any of his friends had hitherto encountered in months of China.

Nothing much happened till MacDonald looked up above him into the open sky. He had bailed out properly enough. He didn't feel frightened or uneasy. But his parachute hadn't opened. He tore at the casing across his chest with bare fingers; the chute opened into a magnificent white silk daisy above his head and his heart started beating again. One thought filled MacDonald's mind thereafter: Don't drop the rip-cord handle — it will make a dandy souvenir.

He landed on the side of a mountain. The ground was rough and hilly. One leg received the full impact of landing, and that did things to his ankle. But he was safe. And then he began looking around for the other members of the crew. A young but successful bomber crew they had been, with many successful missions behind them. This was the first time they had had to abandon the plane.

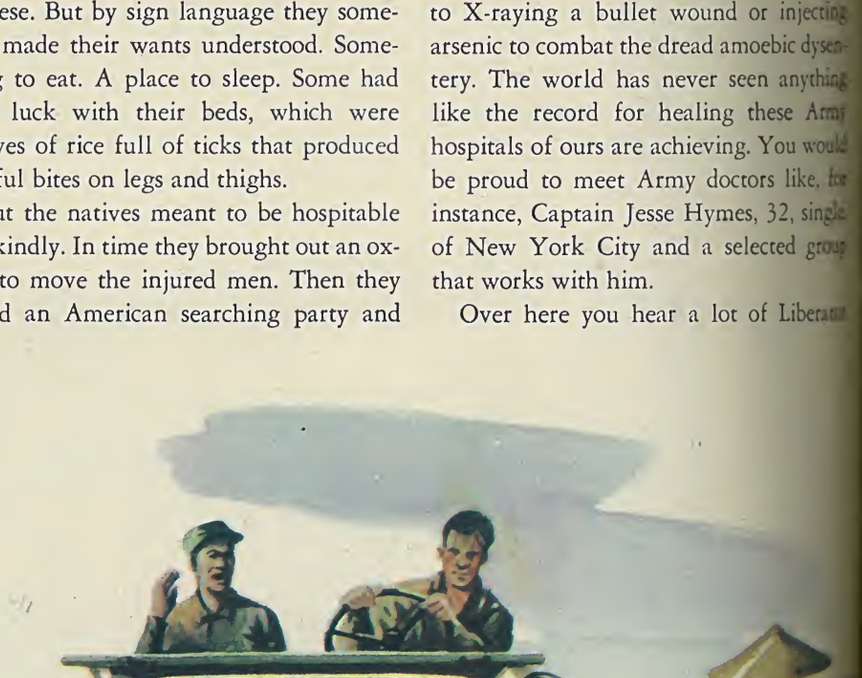
Gradually the crew got together in groups. One of the boys had landed on the other side of the mountain, but kept firing his .45 and listening for an answer until some other fellows heard him and answered back. Two were injured; they and others spent the night out there amid the wet rice. Some got more directly to a native village.

None of the party could speak a word of Chinese. But by sign language they somehow made their wants understood. Something to eat. A place to sleep. Some had hard luck with their beds, which were sheaves of rice full of ticks that produced painful bites on legs and thighs.

But the natives meant to be hospitable and kindly. In time they brought out an ox-cart to move the injured men. Then they found an American searching party and a jeep, already looking for the lost crew. Before another day was over, the two injured boys were in the hospital, receiving proper care for their injured ankles. They will recover.

The Army's rescue service is phenomenal. Our American soldiers are the most expensively trained and the most completely outfitted in the world. Insofar as is humanly possible every foreseeable mishap is studied and guarded against. Every flyer is backed up by a vigilant organization. If he is shot down a plane drops supplies. If a man is injured, an Army doctor will arrive by parachute, or along a mountain track, and patch him up. When he reaches an Army hospital he receives treatment that is the world's best. Our hospitals in China can do everything a hospital back home can, from replacing a broken tooth to X-raying a bullet wound or injecting arsenic to combat the dread amoebic dysentery. The world has never seen anything like the record for healing these Army hospitals of ours are achieving. You would be proud to meet Army doctors like, for instance, Captain Jesse Hymes, 32, single, of New York City and a selected group that works with him.

Over here you hear a lot of Liberator adventure stories. Technical Sergeant Robert G. Anderson, for instance, is a Liberator radio operator and waist gunner, 24 and married, of Philadelphia. He and Staff Sergeant John W. Skurka, a 22-year-old ball turret gunner, of Jarrell, Texas, were part of a bombing crew delivering a load of



You see coolies everywhere.....

ribution upon a Jap target down near Saigon. The mission was a complete success. But one engine was shot out, and they had to climb on three engines from bombing altitude to about 17,000 feet, in order to top the mountain and return to base. The radio compass was shot out. A heavy overcast shut off the stars and made celestial navigation impossible. Even their radio failed them.

Nevertheless they stuck with the ship. They transferred their extra fuel but something jammed. Knowing that if a Jap tracer-bullet should pierce these empty tanks it could create fire and an explosion, they loaded the empty tanks with carbon dioxide fumes from two fire extinguishers, thus eliminating one possible menace.

At 3:30 in the morning, after limping along for eight hours with a dead motor and having covered nearly 1,000 miles of their home journey, they took stock. Position: unknown. Available fuel: not over 90 minutes. They stretched that a little. It was 5:20 when the pilot, without waiting for the engines to stop and the plane to start falling, gave the command to abandon ship.

Everybody left in rotation. Three men went out the camera hatch in the rear; the rest jumped from up front. Engineer, radio man, top turret gunner, navigator, bombardier, co-pilot — they jumped in the prescribed order. The pilot was the last to leave the ship. That is orders, too.

Anderson figures it took him about 20 minutes to parachute to the ground. His landing bruised his back and he rested for half an hour before climbing the mountain and looking for white patches of silk which would indicate other parachutes and the rest of his crew. He fired some shots: no answer. He walked and kept on walking. His flying jacket grew heavy: he discarded it. He tossed away his flying boots. But he kept his jungle-pack and his knife.

Finally he met up with the B-24's top turret gunner. Together they found a village; made it clear that they wanted to be taken to where the other members of the crew might be. So they caught up with the crew at a second village, finally reached another village where they met the American missionary. They were — well, let's not say *how* far, from the border of French-Indo-China, which, of course, is Jap-held territory.

Some native grapevine had sent ahead word of their coming. Food and beds were waiting. Someone had discovered where the damaged B-24 had landed: the next day the pilot and the missionary drove there by horseback, and made sure nothing remained for Jap spies to make use of. Then they started their travels, stopping here and there for a banquet given by some Chinese generals in their honor, or some native celebration. Six days later they were back at base, with the two injured men delivered straight to the hospital, and promise of a quick and complete cure for both.

Not every mission ends in a mishap — of course. Day after day our bomber planes go out and drop their load of punishment and come back, safely. A bomber pilot's life develops a sort of routine. The work may not be entirely serene, but one day is much like another day. More often than not there are no thrills to write home about. Even when there is something exciting to say the story cannot, under war conditions, be sent home in letters to the folks.

Any American flyer or soldier who has fought alongside the Chinese in Burma or along the Salween will tell you what admirable soldiers the Chinese are. They form the majority of General Stilwell's army. In the raw they don't look like much—under-fed, ill-equipped, bothered with skin diseases and such — but given GI clothing and guns and training and food, they develop quickly. They have the fighting spirit.

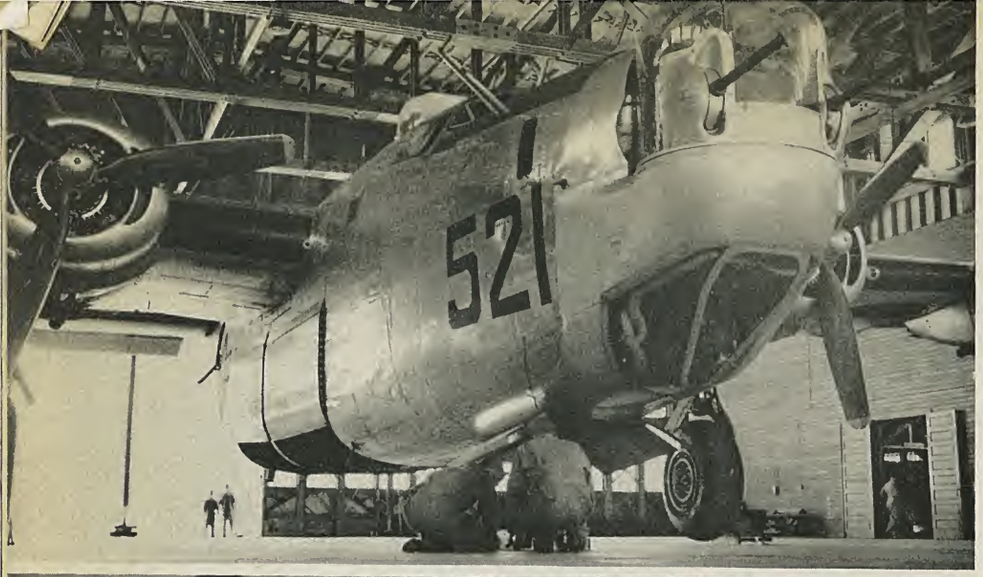
China, of course, has its problems. One that greatly concerns all of us today is its need of establishing the unity required to strengthen it as a fighting power. This should come.

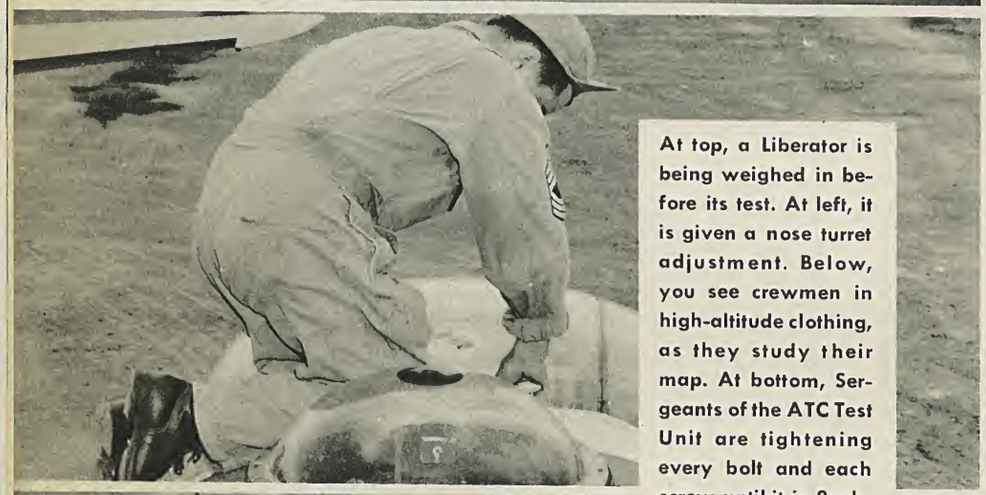
Without doubt it is a good thing that there are Chinese in China as well as Americans, helping us fight our war against Japan. It is an agreeable surprise to have one GI after another tell you, "These Chinese are little fellows, but they're willing, and they're almighty cheerful." Cheerful — yes. Ding-how!

Right on the target!

"Supply is our problem in China," said General H. H. Arnold early this year. "Every item of equipment necessary for the maintenance and operation of our 14th Air Force must be flown into China from the outside. The crews of a heavy bombardment group in China must ferry over their own gasoline, replacement parts and everything else in their own B-24's. Until such time as we conquer the territory and build the road into China, or capture a seaport, we must follow this procedure . . ."

Native labor does military job





At top, a Liberator is being weighed in before its test. At left, it is given a nose turret adjustment. Below, you see crewmen in high-altitude clothing, as they study their map. At bottom, Sergeants of the ATC Test Unit are tightening every bolt and each screw until it is flush.

ASSURING SAFETY IN A T C

THE safety record established by American planes flying overseas for the Air Transport Command would have seemed incredible before the war started. The meticulous system which creates this record is illustrated by the ATC Test Unit in operation at the 36th Street Army Air Base in Miami, which is one of the major points of departure for our planes bound to other continents. This Unit, commanded by Major John M. Tillman, puts America's latest planes through exacting long-range cruising tests.

Organized last February, the Unit was directed by ATC's Special Projects Division to compile long-range testing data so that American pilots would know every cruising characteristic of every plane they were called upon to ferry across the Atlantic or Pacific.

Until this work was started, each airline often flew with different combinations of power settings, altitudes, gross weights and other variables for the same planes. Army ferry operations were figured on maximum gas or load capacity rather than on exact data which showed the best performance settings for each plane.

The job of the Test Unit is to make sure, to the nearest degree of accuracy, of the precise settings at which pilots can get the maximum long-range performance from a given plane. The data learned from test flying are then compiled into Tech orders, which travel with each plane.

"Our tests on existing types of planes enable us to recommend accurately how much gas, oil, and cargo-passenger weight can be carried on each ship," Major Tillman explains. "Overloading with gas can be avoided, making maximum space available for valuable cargo or passengers, without creating worry about safety factors. Our aim is to make long-range flying absolutely safe for every ship sent overseas."

Until the ATC Test Unit was set up, planes received two types of tests: performance tests to see that they met factory specifications, and tests of tactical behavior. Neither type of test was carried on with the high gross loads carried by ATC, or at altitudes flown long-range, such as the hop from India to China, where the minimum altitude is 16,000 feet. The new manner of testing is filling a need which world-circling ATC pilots have welcomed.

AAF Photo

Religion and airmen

Lieut. Col. Harding, who was in the last war with the Seventh Division, and has been serving overseas in this one with the Ninth Air Force, reports a survey.

BY LIEUTENANT COLONEL JACK HARDING

EVERYBODY remembers Eddie Rickenbacker's ordeal at sea, and the credit he gave to divine intervention for his salvation. Relatively few remember that, not long after that stirring event, a young sailor of forgotten name had a similar experience and, after being rescued, made one of those simple, limpid statements that have highlighted the stories of this war.

"Did you pray while you were on that raft?" he was asked.

"No," he said. "I'd never prayed much in my life before. So I didn't think it was fair to God to start when I was in trouble."

When I heard that remark, I thought I'd make a sort of personal survey. How *do* our fighting men feel about religion? That was what I started to find out, in a pretty thorough, unbiased survey among chaplains, commanding officers, ground crews and combat personnel of the Ninth Air Force.

With minor variations, these fellows are like all the other youngsters you'll find in any other air force, distinguishable only by their shoulder patches. So their responses may doubtless be taken as fairly typical, even though my survey was far from being a scientific Gallup Poll of all the Air Forces.

Let's take the chaplain first. It is possible to say unequivocally that Army chaplains are mighty desirable citizens to have around the place. For themselves, they probably

A.A.F. Photo

Communion service back of the lines for lads of the Ninth Air Force, then in North Africa.

take as much from the Army as they give; it is inconceivable that a chaplain isn't a better minister of the gospel for having had Army experience. He's up against life in the raw, and in many cases this is a new experience. He has no time to live in his ivory tower, even if it is buttressed with concrete as thick as submarine pens. Very few airmen want chapter and verse from him; they demand direct application of religious principles to their immediate personal problems.

"They ask for help about all sorts of things," said Chaplain (Major) J. F. Smeltzer of Shamokin, Pa., Protestant chaplain of the Ninth Air Force. "Because our office is always open, and because they're sure of a sympathetic listener, they bring us such problems as finances at home, why they're not getting promoted, why the chow is so bad, and any number of other affairs quite unrelated to religion. You see, the chaplain is the strongest link between the man and his home. He becomes a symbol of the civilian life and fondly remembered social order where things could be put right without standing at attention and going through channels."

Patently the chaplain serves a most useful purpose as adviser and friend. In his more official aspect he conducts religious services according to the dictates of his faith and the exigencies of the combat situation. Aside from customary Sunday morning devotions, in many groups Catholic communion services and Protestant prayer meetings are held before the boys take off on a mission, which may be any time from pre-dawn to late afternoon.

"I have no objection to such pre-mission services," says Col. Wilson R. Wood of Chico, Texas, commanding a B-26 Marauder group, "provided they're held before the briefing. Between briefing and take-off time I want my crews thinking about the job they've got to do, not about their salvation."

A substantial majority of the commanding officers permit such services for those who wish them.

On the question of Sunday morning devotions all are in accord. The group C.O. who places any stumbling blocks in the way of regular Sabbath services is rare.

"Chaplains must remember, though," goes on Col. Wood, "that this is a seven-day war, and Jerry's usually busier on Sunday than on any other day. If nothing in line of duty stands in the way, services are O.K. with me. I don't check church attendance; I neither encourage anyone to go, or dissuade anyone from going. That's each man's personal affair."

That's how most group commanders feel about it.

How the combat personnel feel about religion is hard to say unless you define your terms. By "religion" do you mean praying in a tight pinch? Or going to church regularly? Or becoming converted? Or, with simple, abiding faith, placing your destiny in the hands of a higher Power?

It is certain that some heretofore irreligious young men now attribute to God their rescue from apparently inevitable death.

Take the fighter pilot who, returning from a mission, went directly from interrogation to seek out Chaplain Robert K. Foster of Cincinnati, group chaplain.

"I went into a spin at 23,000 feet," he said. "I tried everything I knew, everything I'd ever been taught. I didn't lose my head or black out; every second of the time I was trying to right that ship. Finally I knew it was no go. I was finished. Somehow I didn't feel afraid. I was sad, very sad, because I knew I wasn't going home again. Maybe you couldn't call it a prayer, because it never reached my lips. But there flashed through my mind, "Oh, Lord, *do* let me go back home!" My hands were off the controls when, at 200 feet, that Mustang came out of the spin, leveled off, and here I am. Chaplain, you can't tell me I was alone in that ship."

A Liberator pilot has this to say: "I've flown more than fifty missions, many of them plenty rugged. Before I was half way through I knew that if I finished up it wouldn't be luck. I don't go to church now any more than I ever did, and I don't believe I go in for prayer any more than before. But on lots of those missions I know I haven't been flying the ship, that God has taken over."

Chaplain (Major) F. X. Singleton of Fresno, Calif., Catholic chaplain of the Ninth Air Force, relates an incident of the famous Liberator bombing of Ploesti, when one of the B-24's was forced down in the desert with eight of its crew surviving. The pilot, one of only two Catholics in the crew, held daily prayer services, saying his rosary while his comrades knelt. The others, hesitantly at first and then boldly as they learned the unfamiliar words, joined in. When, after many courage-sapping days they were found, all attributed their salvation to divine aid.

Such testimonials are legion. They are eloquent of young Americans finding their God when everything looks blackest. But do they result in conversions? The answer is overwhelmingly negative.

Says Catholic Chaplain Guy A. Moss of Bloomington, Ill., assigned to a bomber group, "I've never known combat experience to produce any lasting conversion. The closest I've come to it on this base was once after a particularly tough mission when a young flyer approached me, saying 'Chaplain, I've noticed the Catholic boys coming out of your communion service before a mission, and they look as if they

had something the rest of us lack. I believe that if my time came I could face it better with that kind of faith. Will you give me instruction?'

"Naturally I agreed eagerly. The next day's mission was a milk run, which must have changed the kid's mind. It was weeks ago that he asked for instruction. Yesterday I saw him and asked him when he was coming in. He didn't even slow down, but gave me an airy wave. 'I'll be in, Chaplain,' he said, 'just as soon as I get time.' "

Other chaplains agree that conversions are almost non-existent.

How about church attendance?

"This war," we hear thundering from certain quarters, "will bring men closer to the church. You can look for a great religious recrudescence."

"Because of war, because boys are taught to be killers," warn others, "organized religion will suffer a terrific setback."

Relax. They're both wrong. The unvarnished truth is that the ratio of church attendance is just about the same at combat level as it is back at headquarters or in civil life.

It's when you examine the question of prayer that you encounter as many different attitudes as there are different types of mentality, conditioned by upbringing, education, religious habit, and the multitude of complex factors that make a man prayerful or otherwise.

"When I go out on a mission," says one bombardier, "I never pray that I'll get back safely. I pray that I'll hit that damned target square on the button so we won't have to go back there any more."

A spiritual brother of the sailor cast adrift was Staff Sergeant Jesse H. Lewis, tail gunner of La Grange, Ga., who with Staff Sergeant George Williams of Chicago survived a bomber crash in the North Sea. For five and one-half days the two were adrift, overlooked by planes and ships until they had paddled their way to within eight miles of the English coast.

"I never prayed once on that trip," affirms Lewis, "and neither did Williams. Guess we just weren't in the praying habit.

"The closest we came to that was just before we spun into the drink. I didn't say a thing. But Williams said, 'Well, Mom, here comes $10,000.' Maybe you could kinda call that a prayer, in a way."

If you think they all pray for the same thing, you're dead wrong. One leather-panned crew chief prays ardently and articulately on every mission. For the welfare of the crew? Not on your life.

"Sure, I hope them guys flyin' that baby'll come through all right," and the words ooze out around a cud of tobacco. "But what the hell? They ain't the first crew that've flew her, nor yet prob'bly the last. You can get Joes to fly. But get another ship like that? Not easy. I've seen her full o' holes, I've seen her on fire, I've watched her come in when nothing but God was holdin' her together. I ain't heartless about the jokers inside her. But if there's only one of 'em alive I pray he'll be able to bring her in."

Pray he does, too, with an odd mixture of reverence and what in a less sincere spirit would be blasphemy. "Oh, Lord," he sometimes almost shouts, "don't let nothin' happen to that goddam ship!"

One lad is haunted by the thought that the fellow he's shooting at is also a child of God. "If I pray the Almighty to get me out with a whole skin," he says, "I know that to do it He's got to let that Nazi down, because only one of us is going to tell about it. Well, that guy's got just as much right to pray for deliverance as I have, hasn't he? So instead of praying louder than he does, I try to fly better and shoot straighter, and let God decide the question for Himself."

Contrast this with the pilot who says, "I guess I don't pray in the ordinary sense. Since I've been flying I've taken on a different slant toward God. 'Way up there above the earth I'm not afraid of Him any more. I feel cleaner and freer, and more friendly. I often simply talk with Him as a friend."

A thoughtful lad still groping for the answer says, "I really don't see why any deeply religious person *should* pray. He should be sure of the outcome, sure of his own salvation. If he prays he's only trying to sell himself over again."

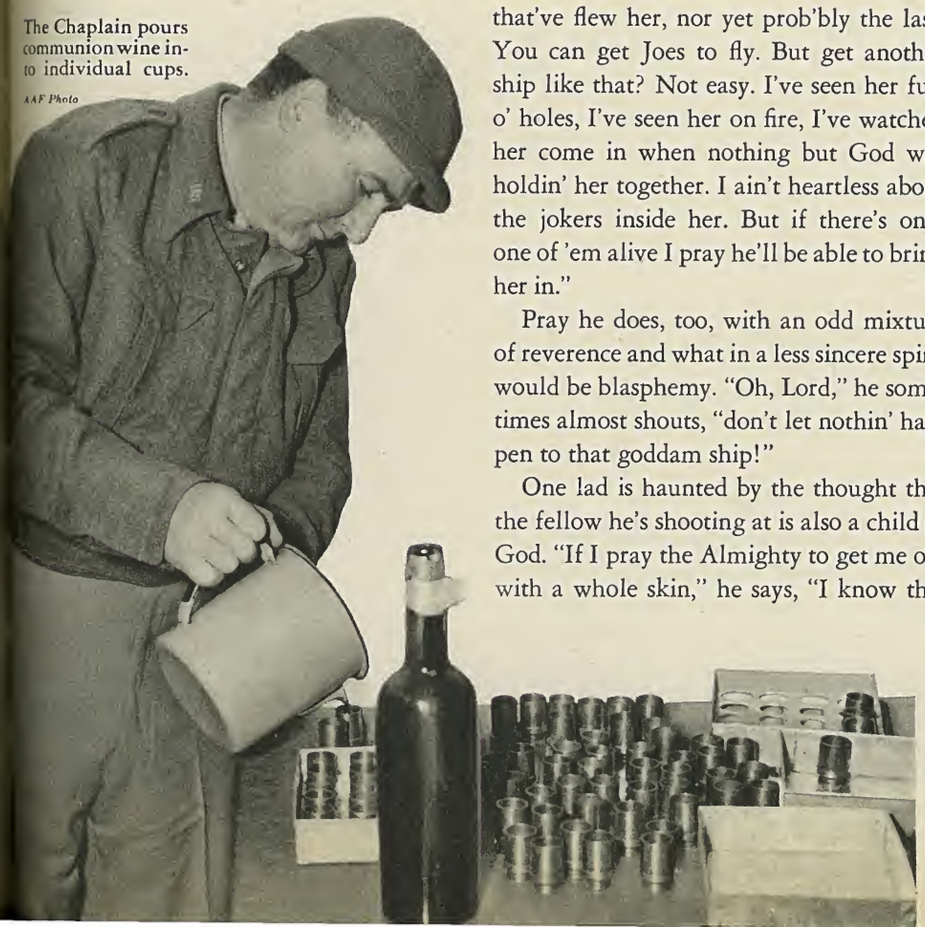
With so many young fellows finding contact with the Deity through combat, why is it that church attendance figures don't balloon? The answer is largely that the compensating force of fatalism is at work.

"When I get in a tight corner and pull out of it," says Staff Sergeant Dero E. Poynter of Los Angeles, "it's just because the Recording Angel's on the wrong page. I never went to church before. If I started now I might change my luck, which has been pretty good so far."

Adoption of the fatalistic outlook is not to be wondered at when one considers the good crews, flying good ships, who were knocked out through the odd circumstance of flying a certain position which on yesterday's mission was the safest spot in the formation. It was just that their time had come, and there's no more to be said.

Religion at combat level is very much like religion anywhere else. Most of the fellows are going along as they did before. Those with religious predilections are going to church and praying; those without aren't. The great majority are willing to leave the religious matter to the Home Front. One young airman sums it up this way:

"A guy's got to be used to praying to do it right. I've never prayed much so I don't suppose it would be easy to get my message through. Now, my mother's different. She's been religious all her life, and always prayed. She's on a VHF hookup with God, so I'll let her take care of me."



The Chaplain pours communion wine into individual cups.
AAF Photo

From Pearl Harbor through June, 1944, the AAF dropped 677,012 tons of bombs. It expects to use another 700,000 tons through the last half of 1944. Bombs are tricky stuff to handle, are surrounded with many precautions. See below.

Hot Stuff for the Liberators

Above: Loading a Liberator for the kill.

By
Master Sergeant Jules Archer

By Airmail from the Southwest Pacific

WHEN an Armament or Ordnance man talks of a bomb, he refers to it respectfully as "her" — and not without reason. You just never know about "her." If she breaks loose from the bomb hoist, she might — then again, she mightn't. At any rate, you don't collect cobwebs while she makes up her mind.

Being temperamental, she might decide to blow up without any provocation or warning whatever. When you're married to bombs for the duration, you live up to your safety vows — and hope for the best.

"After you get to loadin' 'em every day," one Ordnance man in the Fifth Air Force told me, "it gets to be sort of routine. You kind of forget what they are. Until one day something happens. Brother, after that you *never* forget!"

The Army never forgets. Rules for handling hot stuff are strict and uncompromising. Any Sergeant caught smoking in a bomb dump finds himself a PFD (private for duration) the next morning. Regulations forbid the trucking of bombs without strapping or chaining them to the bomb trailer. And woe betide the responsible person who allows weeds to grow in a bomb dump. They're a definite fire hazard, especially in jungle country.

Since hot stuff isn't particular where it expends its energy, the Army makes every effort to keep it a cripple until the chips are down. This is done by keeping bombs separate from their "stingers," as the boys on the line call fuzes, until the actual moment of loading. While this precaution doesn't entirely remove the danger of premature explosions, it definitely lessens them.

Jap ship burning after Liberator strike.

The three principal parts of the ordinary bomb are the nose fuze, the bomb itself, and the tail fin. The nose fuze contains the small primer charge necessary to set off the hot stuff in the bomb. The tail fin guides the bomb straight to its target.

This is how a bomb works. The nose fuze contains an arming vane — a propeller usually set for 150 to 500 spins, depending on the height from which it will be dropped. When the bomb falls, air current spins the vane, loosening safety pellets which are set between the nose plate and the firing pin. The pellets fall out, and when the bomb strikes the ground, the nose plate is free to smash back on the firing pin. This sets off the fuze charge, which in turn sets off the real hot stuff in the bomb.

Bombs used in the Southwest Pac... range from twenty pounders which, if y... were tired of living, you could juggle l... Indian clubs, to the two ton jobs which t... Liberators often specialize in carrying. B... the type of bomb chosen depends upon t... nature of the mission. To support the inv... sion of Lae, for example, one hundr... pound phosphorus and smoke bombs w... used, to screen the landing of paratroop...

At Hollandia, Dutch New Guinea, p... to our successful invasion, large forces ... enemy aircraft on the ground had to ... destroyed. We dropped clusters of twe... pound fragmentation bombs. During ... famous attack on the Bismarck Sea con... one ton babies were the favorites, since bl... from near misses could do as much dam... as direct hits.

The men on the line are more afraid ... the small frag bombs than they are of ... thousand pound monsters. The twe... pound midgets are bound together by w... six to a cluster. It takes only a .38 cartri... in the nose-cap to sever the wires and sca... the frags for action. Not much encour... ment is needed to set off the cartridge.

Parachute bombs, the newest style ... simply float to the ground, lay there f... few seconds . . . then every man for hims... These are packed three to a cluster, w... private chute for each bomb. Med... bombers are fond of them because they p... mit treetop-level bombing, with time ... the planes to get away before the ex...

You just never know about hot stuff. Sometimes . . . well, sometimes she blows, and then a soldier may get a snapshot like this, showing results.

sions. Low altitude bombing is dangerous, because sometimes the bombers themselves are hit by their own blasts.

Daisy-cutters, or anti-personnel bombs, take a long nose fuze, which is designed to explode the bomb before it burrows underground. This fuze is the Jimmy Durante of them all, extending about a foot and a half in front of the bomb nose.

Frags, which are mostly metal with a small amount of hot stuff to send it flying in all directions, are not ordinarily a serious fire hazard. But demolition bombs are ticklish babies because they're thin-skinned and sensitive, being practically *all* hot stuff. If fire or a hot metal fragment gets into a dump loaded with "demo's," it's advisable not to be there.

WHEN a "floating arsenal" pulls into Guinea, the QMC greets it with 2½-ton Army trucks and bomb trailers. In ports which have no wharf facilities, amphibious "ducks" swim out to the boats, take on the bombs, swim back to land, and keep right on going to the bomb dump, without so much as shaking the water off.

When there are wharves in the port, huge cranes lift four and five thousand pounds of bombs at a time out of the boat onto the waiting vehicles. Needless to say, the hot stuff is lowered onto the trucks and trailers more gently than any infant was ever lowered into a cradle. The final stages of descent are guided by human hands and prayer.

Large bombs come off the boat naked except for two waist bands to protect them against shock or damage. Formerly, these were made of metal, but the bands are now all paper, a metal-saver as well as a better shock absorber. None of the old metal bands were wasted, all being scrupulously collected and returned to the States as scrap. Small bombs are packaged in metal or wood crates.

Fins for large bombs are housed in square metal containers, which I subsequently saw in the "Jolly Rogers" chapel, converted into seats for worshippers. You've heard of the Jolly Rogers. They are one of the most famous Liberator outfits in the Pacific.

Heavy hot stuff is placed on bomb trailers, which are equipped with hoists, and have grooves in the floors to keep the bombs from rolling in transit. Smaller fry, in their crates, are loaded onto the trucks. As each conveyance gets its maximum freightage, its crew hops aboard, and the vehicle crawls away.

At the bomb dump, where the QMC takes its cargo, the Army has provided for the storage of bombs with elaborate precaution. Each area in which bombs are to be stacked must be cleared of grass for fifty feet around. Revetments are built around the stacks, so that in case one batch should go off, the fragments will not fly horizontally and set off adjacent stacks. A minimum of one hundred yards of space is required between revetments.

Both crated and uncrated bombs are stacked in rows, with aisles between to permit bomb trucks to drive through. The aisles also prevent too much accumulation of heat in large stacks, and the consequent possibility of spontaneous combustion.

When Fifth Bomber Command gives the order to load the Consolidated B-24 Liberators, the "Jolly Rogers" sends its bomb crews out to the dumps in bomb trucks with trailers, four men to a crew. Loading orders so often come at 11:00 P.M., or shortly before, that the crews refer to themselves as the "midnight mechanics." To make the lot of the bomb men easier, the new C.O. of the "Jolly Rogers" has sent a portable kitchen out to the airstrips, where hot coffee is served from one Liberator revetment to the next.

Seven thousand pounds is the maximum load for the bomb trailer. It takes a first-grade driver to handle a bomb service truck, with one or two trailers of hot stuff behind him. He's got to know how to set his brakes for the load, and how to back up the trailers to the exact spot where the bombs are to be loaded or unloaded.

Bombs of one hundred pounds or less can each be lifted onto the trailer by one man. Above that weight, it takes four men. For anything over 500 pounds, the service truck does the job. Its automatic bomb hoist, home-made by "Jolly Rogers" ingenuity, is powered by the truck's own motor. Ordinarily, the hoist would be hand-operated, a laborious job.

A wire cable with a two-hooked bar is lowered above the bombs, then hooked by the men into the iron loops of the bomb. Hoisted aloft, swaying, it is slowly driven to the waiting trailer. On the day I watched

Pulling 12,000 pounds of bombs over a corrugated road in New Guinea.

Fuzing and loading bombs in preparation for a Liberator mission in the South Pacific Ocean.

men loading, one soldier was standing on some thousand pounders, watching the truck's well-used winch cable with anxious eyes.

"She don't look too good, fellas," he was saying. "I don't trust her." Unfuzed bombs, which have torn loose from the cable, falling four feet to the ground, have been known to explode.

The service truck driver then backs his perilous load until the bomb dangles over the trailer. With great caution he lets the cable out, as two panting men guide the mammoth explosive into the proper groove of the floor-bed. Hitching two loaded trailers behind him, the driver gently hauls his load out to the main road. Other drivers generally give him a wide berth.

Driving twelve thousand pounds of hot stuff over bumpy, corrugated New Guinea roads is no job for speed demons. Drivers are allowed up to twenty miles an hour, but I've rarely seen them go over ten. They usually travel even slower than that. Bombs don't take kindly to jostling.

When the service truck reaches the bomber for which its load is intended, the bombs are lowered in the rear of the revetment in neat rows, G.I. fashion. When it's loading time, one bomb at a time is lifted again and set down parallel to the bomb-bay, on two logs used to roll it directly under the bomber. One man attaches the fin, and then holds it straight to prevent damage, as two men roll the bomb into position to be lifted into the bomb-bay.

To get the thousand pounders into their cradles, the "Jolly Rogers" invented another labor-saving gadget, a motor-driven lift, attached to the bomb-bay partitions. Two straps are placed around the bomb, and one man presses the lift button that starts the "elevator," while two men carefully guide the bomb up, keeping it level. This is the trickiest moment of all. The bomb must be brought level directly under two snap hooks on the bomb shackle, where it is caught and locked. If the brackets are pulled too fast, the bomb may give way and drop.

Each man has his own job to do, and the crew works with impressive teamwork. Time is a factor. While one man is securing the fin, another is attaching the nose fuze, and still another running the arming wires through the bomb vanes, to keep them from spinning.

When the bombardier releases his bombs over the target, by means of toggle switches, these arming wires are retained in the bomb-bay, after slipping out of the vanes as the bombs fall. This release allows the vane to start its fatal spin.

Like any other type of eggs, there are bound to be bad ones every now and then. Usually these can be determined by the inspection of each bomb at the dump, made before the bomb is loaded onto the trailer. The damp, wet climate of Guinea is a constant thorn in the side of Ordnance men, since bombs and fuzes, which must be kept dry as possible, sometimes deteriorate.

A bad bomb, besides being a waste of time and space on a mission, is also a serious menace on the ground. If considered too dangerous, it is gently removed, taken to a distant spot, and blown up with TNT. If rated safe but of dubious performance value, it is used for practice bombing by crews in training.

When any pilot reports that one or more of the bombs he dropped on a combat mission were duds, Ordnance men immediately check the lot number of the bombs. Each time a load is checked out of a dump, both lot numbers are turned over to Ordnance for records. The lot numbers will quickly locate the bomb stack from which the duds were obtained.

All the other bombs in the stack will then be taken apart and examined. If they are found to be defective, the arsenal manufacturing them will be notified, and the lot number discontinued. On the other hand, if nothing wrong can be found, a few of the bombs are taken out and dropped on a practice test. If the hot stuff proves to be hot, the lot is again certified for use.

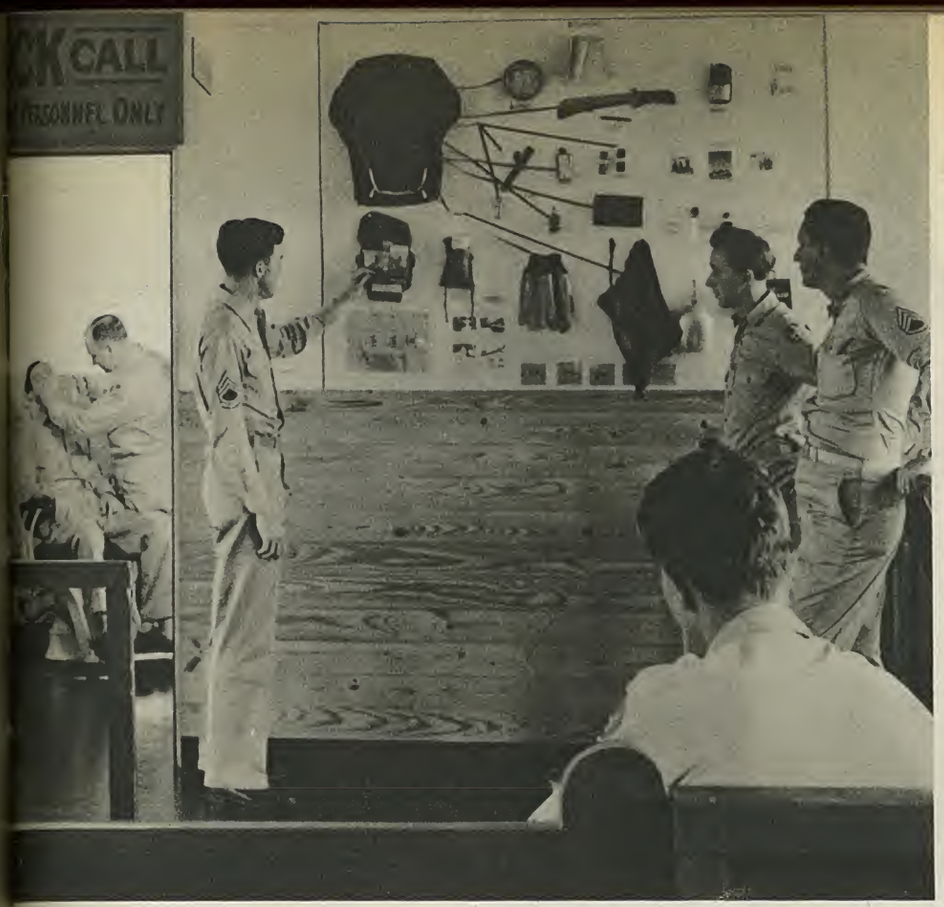
Should something go wrong on a bomber's take-off — a blow-out, a slip off the road, an engine failure — the boys who handle hot stuff are immediately rushed to the scene. When the crack-up results in an engine catching fire, their job becomes breath-taking melodrama. Oxygen tanks may explode. Gas tanks might go up, detonating the bombs with them. Ammunition might start exploding.

The first duty of the bomb men is to defuze the bombs. This must be done before any injured personnel can be removed from the plane. Otherwise, in taking them out, the bombs may accidentally be jostled and go off.

Defuzing bombs is a job that requires steady nerves and nimble fingers. Sometimes it's necessary to hack away a clearance in the side of the bomber with an ax to get to the bombs. Often the plane's metal is too hot to work under, so the job must be left for awhile. Once the bombs are defuzed, the service trucks cart them away as quickly as possible.

They haven't got "goldbrick" jobs, these men who take daily risks nonchalantly.

But it isn't handling hot stuff that really bothers them. What they most worry about is food. "Hell!" is the most frequent lament. "Bully beef *again?*"



Liberator crews at Morrison Field getting last minute check-up on their teeth.

Medical Brief *for World Travellers*

BY CAPT. FRANK M. WOOLSEY, M.C.

When planes like the Liberator put the whole world within 60 hours of your home-town airport, diseases in Africa and Asia take on a personal importance for you. Here is a part of the medical briefing given all travellers leaving ATC's Port of Embarkation No. 1.

THERE is a disease known as Malaria. Some of you have had it. Many of you are going to have it unless I can persuade you to listen and learn how to protect yourself so that you cannot get it. You see, *your chances of coming back a casualty from overseas are ten to one* — disease over *everything* else, including bullets.

There hasn't been any major war in history but what more people died from diseases than from other causes. And this is going to be true in this war, unless you will learn to protect yourself.

Of all the diseases, Malaria is one of the worst. All human beings are susceptible to it. Where you are going, the human being who is *filled* with Malaria is the native. He has Malarial parasites circulating in his blood.

Now a certain mosquito transmits these parasites. This little mosquito stings the native and forces her nose right down into his vein. Then she draws up blood and parasites into her body. Then she flies over and stings you.

There is a spurt of spit which goes into your blood. This is filled with parasites. You've got Malaria! You *can't* get it unless you are stung by this mosquito!

The reason it is important to know that the native has so much of the disease is this: A mosquito *cannot* fly more than one mile. Oh, the wind can blow it further, but it can't fly further. Therefore, it is obvious that the nearer you are to the native villages, the nearer you are to mosquitos that are carrying Malaria. You must stay away from the native villages at night!

This mosquito that carries the disease only flies when it is dark, or relatively dark. Suppose it is noon; it is hot where you are. You see a nice, cool, shady place down by a stream, so you decide to go down there to eat your lunch. You must remember that you and the mosquito are now there where it is relatively dark. This mosquito won't know that the sun hasn't gone down yet. *She'll sting you!*

Now most of the protection is necessary at night. If you don't have screened buildings, when it begins to get dark, get under your mosquito netting! Make sure there are no holes in the netting where the mosquito can get through. When you get under that netting, make sure that she isn't inside with you. Look for her; search her out; and kill her before she kills you!

Remember, when you go outside in the evening to take a shower or when you go to the latrine, she may get you then. Protect yourself! First of all, keep your body covered with clothing. Wear gloves if available. Wear high shoes so that the mosquito cannot bite through your socks. They have a nice head net over there for you to use. No mosquitos and very little air can get through. You won't be comfortable, you won't like it, you will swear at it. *Wear it!*

On all parts of the body that you cannot cover, use this insect repellent. Remember, if you happen to have clothing that is tight over your shoulder, this mosquito can sting right through that clothing. If you have been perspiring and your shirt is plastered against your skin, she can sting through there also. Rub some of this repellent on all such areas. The mosquito doesn't like this repellent. Usually she will stay away. If she doesn't, and she comes in contact with it, she will die.

Here I have a Pyrethrum Aerosol bomb.

You will see this bomb used in the planes on the way over and in the barracks. This is a wonderful insecticide. You probably will not be able to get one of these for your own use but you should know how it is used. Hold it up with this cap pointing down. Completely remove the cap, then turn it so that the opened end is pointing upward. You see, it sprays out forcibly. That spray is an Aerosol. You can take a room this size, close all of the windows and doors, spray this insecticide any place in the room for 30 seconds. Leave the room closed for 2 minutes and *every* insect in it will be killed!

HERE I have some Atabrine tablets. You are going to be interested in these tablets because the evening of the day that you weigh in for shipment, you will start taking them. Why are you going to take them? Well, Atabrine is a medicine which prevents the symptoms of Malaria.

Now get that — the symptoms. Atabrine does not keep you from getting Malaria. It only keeps you from knowing that you have it. "Well," you say, "Doc, I don't think I want to take it, because when I get Malaria, I want to know it." Perhaps you are right but I don't think you are. I believe that the longer you go without knowing that you have been careless and gotten Malaria, the happier you are going to be.

There are very good reasons why we are giving you Atabrine. Sincerely, *you are important!* That's why you are here; that's why you are going by air. You have a job to do, and this Atabrine is going to help you do that job. When you take Atabrine, even though you are careless and allow yourself to be bitten by a mosquito that gives you Malaria, so long as you are taking the Atabrine, you will not *get sick.* You will be able to finish your job. When you stop, if you have been careless, you will come down with the symptoms, the chills and fever of Malaria.

There is another reason why it is important for you to take Atabrine. As I have told you, this doesn't keep you from getting Malaria. But it does keep you from getting Malaria of the brain. When people die of the disease, they usually die of Malaria of the brain.

Start taking these Atabrine tablets the evening of the day you weigh in. Each day you take one with the evening meal. Eat some food, take the tablet, and eat some more.

There are 14 Atabrine tablets in each box. These will last you two weeks. When you get where you are going, contact your local medical officer and find out how much Atabrine you are to take from then on. At some of the camps, the breeding of mosquitos has been controlled for more than a one mile radius. Therefore, in these camps, they do not have mosquitos and consequently do not need Atabrine. Most of the places you are going, however, are fairly new camps.

I might as well tell you the whole truth. Malaria has us worried! I try to impress everyone who goes through this station with the importance of our protective measures. And yet, many people who have sat where you are sitting have come down with the disease *before* they arrived at their overseas camp. There are some theaters of operation where your chances of being a casualty are 16 to one, Malaria over anything else.

Here is a map of the world. You will notice that there is a large number of red areas on this map. Every red area is a place where they have Malaria! The darker the red, the more the Malaria. *I defy anyone here to show me a place on this map where he is going that isn't red!*

THERE is another group of diseases that I must tell you about. These diseases do not cause as many casualties as Malaria but almost as many. When you get them they are just as bad. These are the intestinal diseases. You have heard of some of them — Typhoid Fever, Para-Typhoid Fever, Dysentery (Bacillary and Amoebic), Cholera.

You can't get any of these diseases unless you eat human bowel movements! Well, how are you going to do that? Where you are going, that is easy. They're in the food and the water. You have seen some of those natives over there, haven't you? Over there in India? They wear long, flowing robes — white in the movies, but not over there.

You will see one of the natives right down in the center of town, right in the bazaar, suddenly stop and squat down and look up at the sky. He will squat there and stare, and you wonder what the dickens he is doing. He is right in the way. People have to walk around him. After a while he gets up and walks away. Then you look down where he was squatting and *there* it is — feces, bowel movements, right there in the street! He doesn't use any tissue paper; he never saw a piece of toilet paper.

His clothes rub against his skin and he rubs his hands on his clothes; then, he picks up some fruit and says, "Soldier, here's an orange. Cheap!" Yes, boy, it's cheap all right. It may only cost you your life, that's all!

BRIEF, TO BRIEF, BRIEFING

BRIEFING, as applied to air missions, was apparently first used by the English some two years ago; today it is one of the biggest words, in its all-inclusiveness, in the airman's vocabulary.

The word brief, derived as an adjective from the Latin *brevis,* meaning short, came gradually to mean a short piece of writing. Thus an apostolic brief may be a kind of papal letter less formal than a bull. *Der Brief* in German means a letter of any kind. A lawyer's brief may be a concise statement of the points in a legal argument.

To brief a document, meaning to summarize its points, suggests what was originally meant by the phrase, to brief an airman. He was given a summary of the purposes of his mission.

Today every series of instructions given either crew or passengers is called a briefing, and there are briefings of almost innumerable kinds—weather briefings, medical briefings, radio briefings, ditching briefings, and even farewell briefings, which may be nothing more than a "goodbye, good luck" from an officer.

Usually an airman's briefing, on whatever subject, is an officer's informal talk, full of information on that subject, with accompanying illustrations which may be charts, photographs, motion pictures, demonstrations of the use of equipment, or a combination of all.

Young medical officers at the School of Aviation Medicine study the Anopheles mosquito through microscopes.

For sources of food and fluid you must stick to those that are authorized by the Army. I said fluid — even some 12 per cent wine may be swarming with these germs. After all, how do they make their wine? They take the grapes and stomp on them with their bare feet. If you are dying of thirst and you can't get any fluid from authorized sources, don't drink unless you first sterilize the fluid yourself. If you are dying of hunger and a native offers you food, don't eat it unless you see him cook it right in front of you before you touch it. It's a lot better to die of starvation than to die with the pains of intestinal diseases. If you happen to get Cholera — when you start having about 30 bowel movements a day with blood and pain—you will know it.

You will probably go down in the bazaars to buy your wife or your girl friend a present. You will pick up a piece of hammered brass or ivory, and hold it in your hand. It's hot — you are probably perspiring; so you put the object down, wipe the sweat off your face and possibly run your fingers across your lips. There, you have it! You have just put your fingers on your lips after handling that object. You gave yourself Dysentery!

I had two men in here the other day who had lived over there for over two years. Neither of them had had any disease — then they both came down with Dysentery at the same time. They had done just one thing differently. They went out and bought a watermelon. They took that melon back to the camp and *scrubbed* it with soap and water, but they forgot two things. First, over there they fertilize their fields with human bowel movements. That melon had grown surrounded by these germs. They couldn't scrub it enough to get it clean. Second, those natives have a very nice trick.

You know, over there the ditches and the sewers are the same thing. Well, they sell their melons by the pound. The evening before they offer them to you for sale, they take those melons and *soak* them in a ditch so that they will gain weight. When you slice them there is bound to be a film of feces over every slice. Result: Dysentery.

There's just one other type of disease that I want to tell you about — venereal disease. Over where you are going, 98 per cent of the people have some kind of venereal disease! In one of the countries we selected a random 700 women and examined them. 696 *had venereal diseases!*

About now you are probably thinking, "The Doc may be right. But how could those people live if they had so much disease? He tells me they are filled with Malaria, that they have so much intestinal disease, and that 98 per cent of them have venereal diseases. How do they live?"

The answer is, they *don't!* If you had been born in those countries, most of you would be dead by now. The average duration of life is about 25 years. What do you think they die of?

In general, only those who have been able to develop immunity to these diseases have been able to live to produce future generations. They have built up some immunity from generation to generation. Immunity which you do not have.

I am thoroughly convinced that most people would not subject themselves to the potentially dire consequences of venereal diseases if they knew the horrible things that can happen from these diseases.

You are probably thinking, "Well, Doc, anyway, I wouldn't go out with one of those native girls. Just look at them. Look at the way they look. I wouldn't fool around with them!"

No, soldier, of course you wouldn't, but let me tell you something. Every month you are over there they get better looking. I have been told that some of them look white after six months.

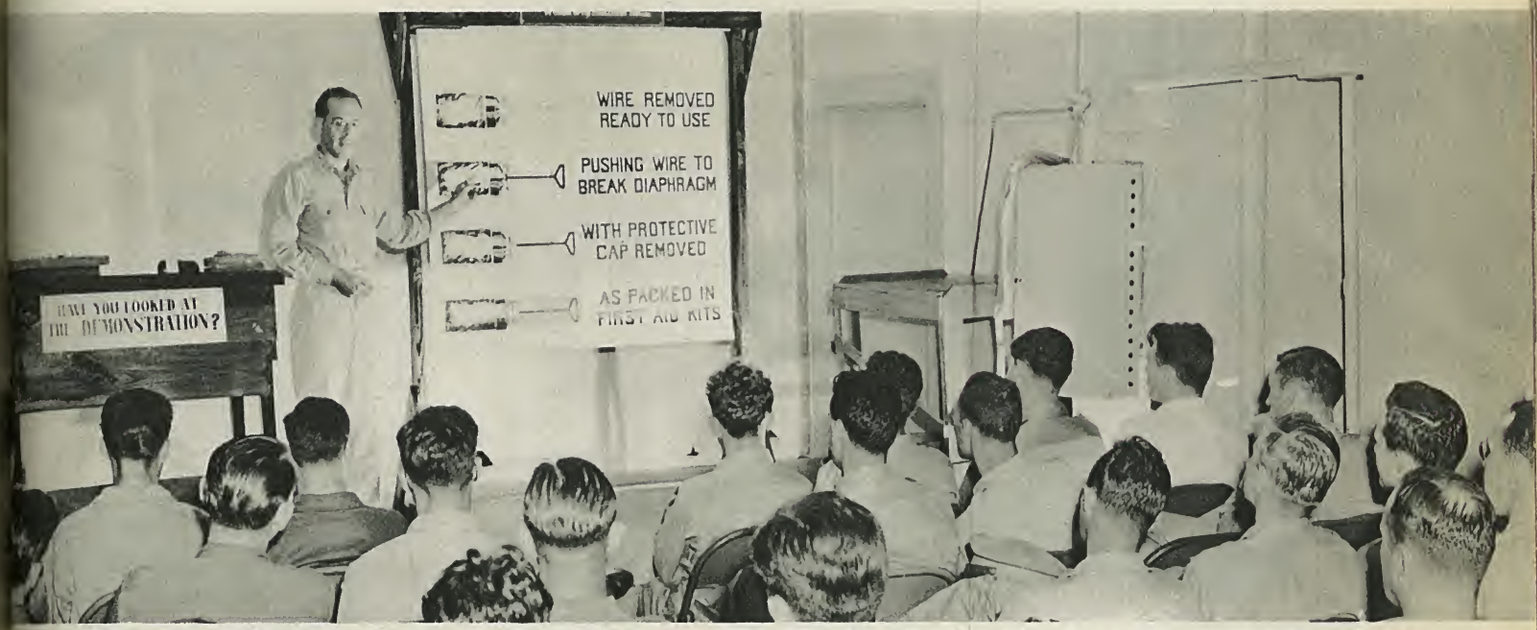
When you came in here this afternoon, your chances of being a casualty while you are overseas were 10 to 1, diseases over everything else. You don't *need* to get any of these diseases. We have talked about the diseases that account for more than 75 per cent of the casualties.

You can't get Malaria unless you are stung by this mosquito.

You can't get any of the intestinal diseases unless you eat human bowel movements.

And you won't get venereal diseases unless you have intercourse!

This means one thing: *Your life is in your hands.*


WIRE REMOVED READY TO USE
PUSHING WIRE TO BREAK DIAPHRAGM
WITH PROTECTIVE CAP REMOVED
AS PACKED IN FIRST AID KITS
HAVE YOU LOOKED AT THE DEMONSTRATION?
Medical briefing of young airmen who are about to make their first overseas flight. The chart gives instructions for use of an emergency hypodermic.

Sending Them *Overseas*

How Foreign Delivery Operates

The Armed Forces take delivery of most planes right at the plant where they're made. But Consolidated Vultee is organized to deliver them any place on the globe.

OVER a south Pacific aerial route a formation of three Catalina PBY's was being ferried to the Dutch Air Force during the days just before Pearl Harbor. Flown by Consolidated crews, the three planes left Wake Island bound for Guam early one morning. After flying for an hour in clear weather, Charles Mattingly, navigator on one of the PBY's, took a fix. His computation indicated that the Catalina piloted by Ed Jones was making 120 knots. An hour later another fix was taken and when plotted on his charts indicated a cruising speed of only 20 knots. In twenty minutes another fix verified the incredible fact that their speed had been reduced to practically zero.

Radio communication with surface vessels was established and the crews learned they were in the midst of a hurricane. Another fix taken within an hour indicated that the three PBY's were 30 miles behind their position two hours before. The force of the hurricane had actually blown the flying boats backwards — a spectacular experience now referred to as the "breech delivery" of PBY's. Courses were altered to the southwards about 300 miles, and a new course set for Guam. Arriving over the Marianas Islands after dusk, the Catalinas traversed a closed circuit all night, from Guam to Saipan and back again, waiting for daybreak. The three big flying boats alighted safely the next morning, after being aloft for 25 hours and 10 minutes.

This incident shows what unusual conditions may be met by Consolidated Vultee's flight crews.

In the corporation's flight department is a section known as "Foreign Delivery." It deals in airplanes. The globe is its territory. If the Navy wants some Catalina PBY's delivered to Pearl Harbor tomorrow, or a few Liberator PB4Y's to New Guinea, or some Douglas R4D's to India, experienced crews are prepared to ferry them.

"We'll deliver any multi-engine airplane which takes off with enough gas to reach an island," declares Art Bussy, Supervisor of Air Transportation. Thus far in hundreds of overseas crossings this group has established the incredible record never having lost a crew member or an airplane — though six crew members are interned as prisoners of the Japanese, have been captured in Manila during the early days of the war. Whenever the safety record is mentioned around headquarters in San Diego, there is a racket of knocking wood. Emergencies have arisen on some trips. Thus far, however, highly trained

The Chief Navigator explains special problem in routing overseas course.

Pilots keep in peak form for instrument flying with Link Trainer

crews have met them and brought their planes through safely.

The Foreign Delivery section is organized under the corporation's Flight & Service Department, headed by a veteran of world flights, Russ Rogers. Assistant to Rogers is Doug Kelley, another pilot of world-wide experience. In direct charge of the Foreign Delivery section is A. C. Bussy.

His assistant is H. R. Peacock, a captain with over 30 deliveries to his credit. Bussy's log books add up to 7,500 hours. He made his first flight in a Jenny in Schenectady, New York, in 1923. In the following years he engaged in commercial flying, test flying and served as a pilot for T. W. A.

Just before Pearl Harbor, crews were regularly plying the route between the west coast and Manila, flying a number of PBY's for the Dutch. Some B-25 bombers were delivered in those days to Australia.

The first delivery to Manila was made in October, 1941. Captain of one of the Catalinas was Art Bussy, who relates now that had it not been for a balking engine on a China Clipper, he might be living on rice and fish in a Jap internment camp. The Japanese "peace" envoy, Kurusu, was en route to the White House aboard a Clipper which developed engine trouble at Midway. It arrived there on November 11, 1941, and for two weeks the Jap diplomat paced anxiously up and down the sands awaiting engine repairs. Bussy left Honolulu on November 12 in a Catalina. Because of limited service facilities at Midway where the China Clipper was undergoing repairs, he was ordered to proceed direct to Wake.

He returned to Honolulu, and on the fateful day at Pearl Harbor was one day out aboard the Lurline, bound for San Francisco. Ships 200 miles behind and a few miles ahead were torpedoed, but the Lurline got through. Bussy now operates a busy air transport business to deliver combat planes for action against the Pacific foe whose net threatened him not many months ago.

Believed to be the only organization in the world outside of military services engaged in world-wide delivery of heavy aircraft, the Foreign Delivery section's personnel include some of the most experienced men in the business. Part of the crew assigned to fly a Liberator Express around the world recently on a technical mission for the British was selected from the group. Captain of the flight was Russ Rogers and navigator on the trip was Charles Mattingly, chief navigator for the section, and author of the latest work on his profession — "The American Air Navigator." To all these fellows, a round-the-world flight is just a succession of long range trips over familiar waters and continents.

Dean of flight captains in the organization is C. A. Lorber. Since 1917 when he began flying for the Navy, Lorber has chalked up approximately 650 flights over the seven seas and in nearly 12,000 hours of flying has visited many foreign lands. A proponent of carefully planned flights, Lorber has never had a forced landing during his commercial flying experience.

Before December, 1941, a small number of crews was delivering planes to several points across the Pacific. Later some of these crews were organized to form Consairway, and are now a separate division operating a scheduled airline to the South Pacific for the Air Transport Command. The number of trained men in the Flight Department has increased and today approximately 35 crews are available for ferrying airplanes.

The service has been operated for the benefit of the U.S. and Allied governments on a non-profit basis.

As a supplement to the Air Services, the crews have often performed rescue work along their routes. They serve on reconnaissance flights over the Pacific, reporting to the Navy any suspicious surface craft along

Trainer.

Flight engineers carefully inspect each plane sent overseas.

At the navigator's position in a Coronado, a veteran determines his "fix".

their routes. While on a search mission for the survivors of a military plane which had crash-landed in the ocean, a crew on a delivery flight picked up some garbled radio signals. In cooperation with another plane which had joined in the search, they took radio bearings on the signals, then proceeded to fly over the spot. The weather was squally; suddenly ahead of them loomed a Jap submarine riding the surface. The submarine had lured them within range. The pilot took swift evasive action, before the submarine could get its deck guns firing — then flashed the location of the sub to the Navy.

High priority passengers occasionally accompany the crews on delivery flights. Not long ago a crew leaving San Diego found Charles Lindberg was to accompany them to Honolulu. The noted airman took turns at the controls on the long flight.

BEFORE a plane is accepted for delivery from the Army or Navy, it is given a shakedown flight of about three hours duration. Fuel consumption of each engine is watched during these tests by the flight engineer to ascertain that it is not excessive at the altitude planned for the flight. Readings of the manifold pressure gauges, tachometer, cylinder head temperatures, oil and fuel pressures are checked. Radio equipment is tested by the operator, and the navigator checks over all the equipment used in determining the course.

Following this first shakedown flight, the crew turns the airplane, together with a list of "squawks", over to the flight maintenance department. Inspectors go over the airplane from bow to stern to note additional discrepancies. All of these faults are corrected. The engines are then given a ground run and all equipment operated. Everything satisfactory, the airplane is gassed to capacity, the compass is swung and the inspector signs the flight release. The ship is then ready for delivery. Much of the credit for successful operation is due the mechanics and inspectors who make sure that no airplane departs unless it is in near-perfect condition.

Efficient crews are maintained by establishing rigid requirements for each crew member engaged in over-water delivery service. Pilots, for example, must have a minimum of 1,500 hours of logged time, 200 of which must be cross country experience. Each must possess a commercial license, restricted radio telephone license and have a C.A.A. instrument rating.

Advancement from pilot to reserve captain requires completion of a Link trainer course, radio, navigation and meteorology courses. Promotion from reserve captain to flight captain "C" requires additional flight training and Link training, with a total of 2,000 hours flight time. Two hundred hours must be multi-engine experience and one hundred hours on one particular type of multi-engine plane.

A flight captain "C" can earn advancement to class "B" after he has completed pilot ground courses on at least two types of heavy aircraft and upon completion of a celestial navigation course. Rigid requirements for flight captain "A" rating include completion of one year's service as a flight captain, checking out on several types of multi-engine planes. He must also complete courses in advanced radio, navigation and Link training.

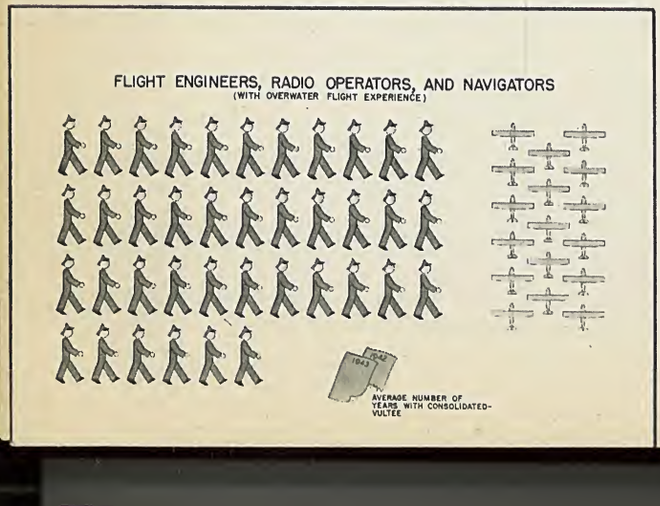
Hiring qualifications for flight engineers include either an "A" or "E" license and some experience in aircraft maintenance. Both "A" and "E" licenses must be acquired soon after employment. The engineer must complete ground courses, including instruction on parachutes, radio and navigation. Flight training includes check-out on all types of planes delivered by the overseas section. The class "A" engi[neer] must also qualify by acting as engineer [on] six shakedown flights and six deliveries.

Radio operators before their hiring [must] have either a first or a second class [radio] telegraph license and a second class [radio] telephone license. Advancement to [radio] operator "A" may be earned by complet[ion] of advanced operator's course, navigat[ion] engineering and parachute instruction [with] training that must include checkou[t on] several types of multi-engine airplanes.

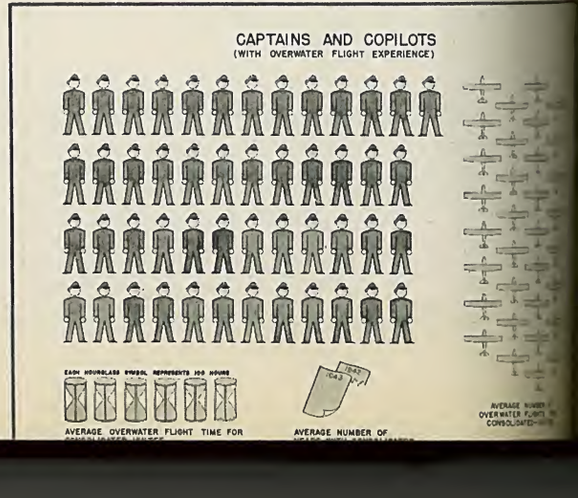
Navigators are employed by the fore[ign] delivery section who have had two [years] air navigation experience or have [been] graduated from a reputable navigat[ion] school. Promotion to navigator "A" [can] be earned upon completion of advanced [navi]gation courses, radio, meteorology, [engi]neering and parachute instruction. [Two] long-range flights with an accumulated [flying] time of at least 50 hours are part of [the] requirements.

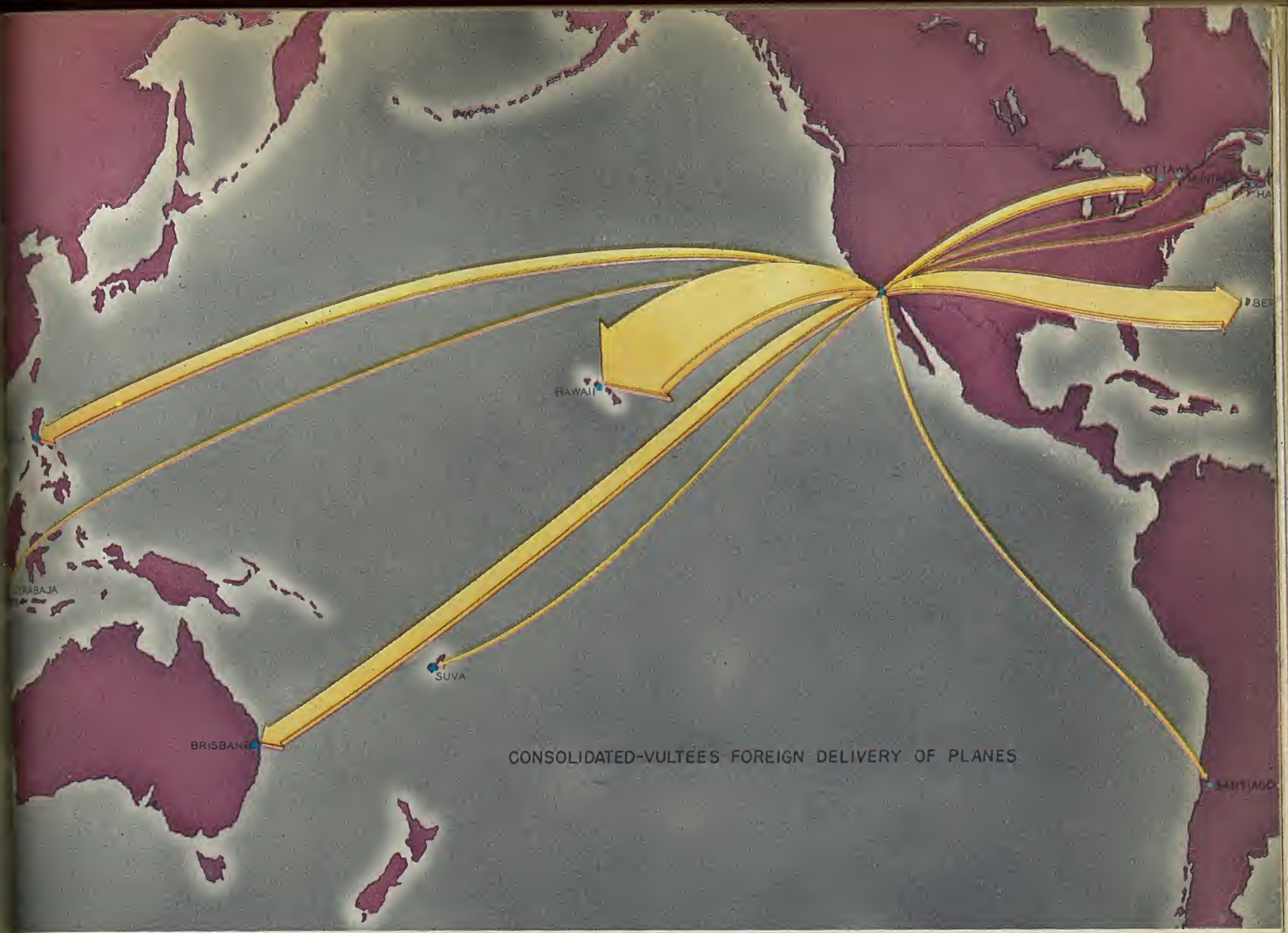
Each crew member, therefore, is a [spe]cialist in his own field, but his [training] qualifies him to perform to a certain [degree] the work of some others. This diversi[fied] experience among crew members is of [tre]mendous help on long-range flights [when] crew members must alternate at [taking] rests.

MUCH of the credit for the outstanding safety record established by the [group] is due the flight engineers. These compe[tent] tive newcomers in aviation now rank [high] in the flight crews of heavy aircraft. [The] flight engineer has assumed the title [of] safety engineer, for he is more intimately acquainted with the engines, electrical, hydraulic and fuel systems than other crew members. These systems are the source [of] potential trouble in any plane and engineers in the foreign delivery section are trained to give attention to every detail.



These charts mean that each of 39 men shown at the left average 7 overwater flights for Consolidated Vultee. The Captains and Co-pilots charted at the right each average a total of 33 overwater flights, and 600 hours of flying time per man.





In the course of putting its Navy planes down at the spot where the Navy wants to take delivery the Company has sent them half around the world.

"My first concern in looking over a plane for overseas delivery is whether the fuel system is intact," says L. J. Bordelon, flight engineer supervisor. "We examine fuel lines for any signs of leakage and check fuel flow to the engines. The fuel transfer system is important, too."

The inspection routine which has been such an important factor in safe operation includes a thorough visual inspection prior to flight. The engineer is required to examine the entire exterior of the plane, then see that no equipment is stored in such a location inside the plane as to create a hazard. No ferrous metal parts, for instance, may be stowed closer than three feet from the master compass transmitter. Emergency equipment such as flares, flame floats, smoke grenades, life rings, rafts, jackets, rations and bilge pump hoses must be aboard and located in accessible places. Fueling of a plane being prepared for delivery must be accomplished under the direction of the engineer two hours before departure.

The navigator on a long-range overwater flight is one in whom the crew members place special trust. A reserve supply of fuel is always carried to cruise for about 3 hours longer than the forecast, but a careless navigator could cut this margin of safety way down by failing to keep an accurate record of his track, ground speed and gas consumption.

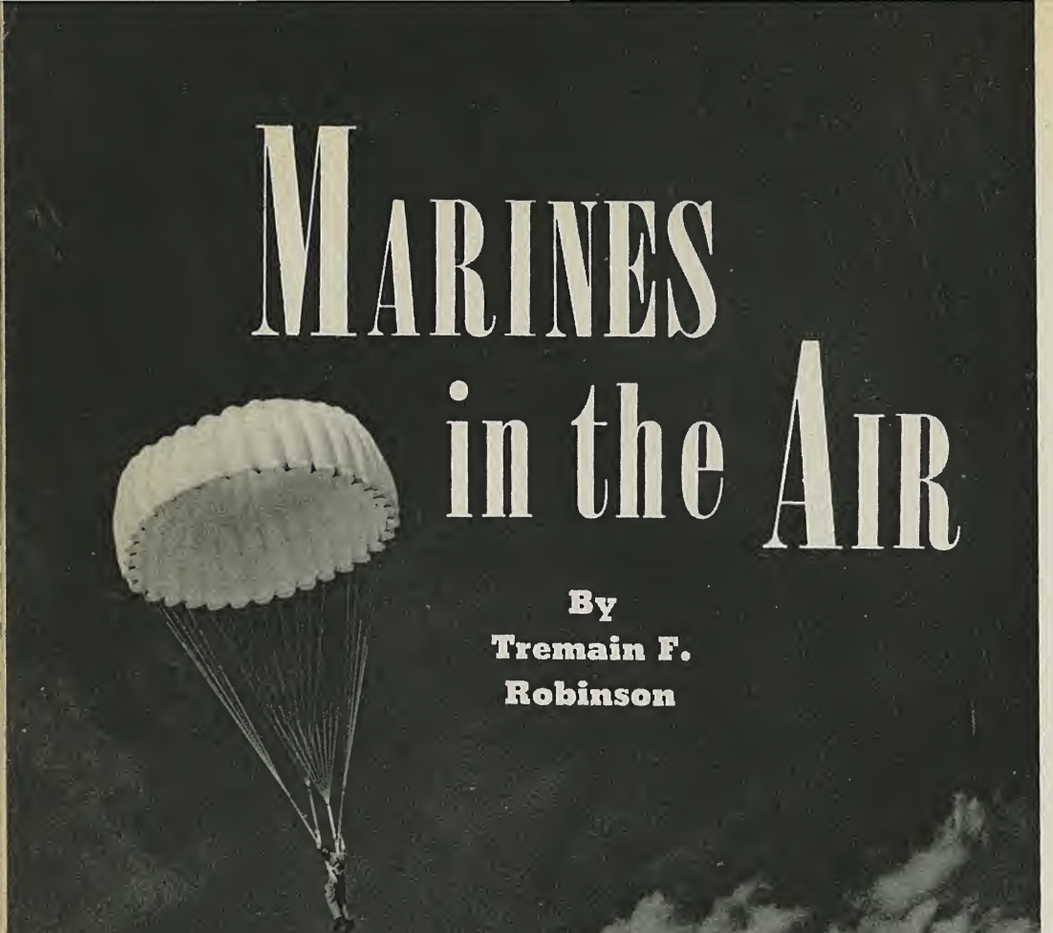
Planes being delivered, for instance, from San Diego to Honolulu, usually take off in the afternoon to arrive in Honolulu after sunrise the next day. Thus most of the trip is accomplished during night hours, allowing the navigator to determine the ship's position by celestial "fixes" — the most accurate position-determining information available on over-water flights. Flight time for a Catalina PBY to traverse the distance is about 17 to 19 hours. A Liberator PB4Y covers the same course in about 14 hours.

The basis for the navigator's plan of the course is weather forecasts provided by the Navy. Each forecast divides the 2266 nautical miles between San Diego and Honolulu into 5 zones. With this information, the navigator prepares a flight plan, showing the course in each zone, proposed altitude, estimated time, and approximate amount of gasoline necessary to fly through each zone.

When the flight plans are completed, the final step is to plot the computed data in the form of a flight graph, called by many air navigators the "Howgozit", which permits an accurate check of how things are going during the flight. This graph charts the distance covered, amount of fuel consumed and hours flown. It also indicates the PN (point of no return). It is possible to turn back and return to the starting point any time before this position is reached, but after the PN, the captain has no alternative other than proceeding to the destination.

Navigators for the Foreign Delivery section have established a reputation for being able to hit any point on the earth's surface with unerring accuracy. And if emergencies arise during a delivery flight, each crew member knows exactly what is expected of him, and what to do.

MARINES in the AIR



By Tremain F. Robinson

They are great flyers as well as great fighters. Few seem to know it—but Marine aviation began in 1912.

IN the air as on the ground, Marines are tough fighters who have left the Japanese punch-drunk wherever they have struck. They have been doing most of their fighting in the South Pacific.

Marines go in largely for fighters and dive bombers, because of the nature of the job they have to do; they do not use the heavy, long-range bombers for strikes. They do use Liberators for reconnaissance and other jobs, and they use the Catalinas for rescue and other work. It was a Marine crew, for instance, which took two Liberators on the famous reconnaissance flight over Truk before our first bombing there.

They speak rather complacently about the jobs they do, often calling them "milk-runs," but there is nothing complacent about their assignments, which cover everything from search missions and interception to flying cover for Army, Navy and Marine bombing missions, and covering infantry attacks, strafing, patrolling, and flying supplies.

What happened to Rabaul is fairly typical of the fighting Marines have been doing out in the Pacific.

Our men started working on Rabaul December 17th of 1943. For about a month and a half the Marines went over in fighter sweeps as often as weather permitted. They were deliberately looking for trouble — more specifically, they were looking for Zeros. They found them. At first from 50 to 150 would swarm up to meet the Marines, and the Leathernecks got some "very good scores." One squadron downed 16 Jap planes in one afternoon there, lost only a single plane of its own during the mission.

Before long, the Japs were refusing to send up their fighters unless the Marines brought some bombers along as big bait. So the Marines accommodated.

The bombers were given the customary cover of fighters — which were followed by other fighters hanging back to pick off Zeros left over from the first flights.

Result was that two months after starting operations on Rabaul the Marines met no more opposition in the air there. The number of Jap planes shot down and air fields bombed, added to the Japs' inability to send in reinforcements, closed the base.

It was in fighting like this that the Wake Avenger Squadron got its score of 71 Jap planes for 1 American in a single mission, and the Hanson Squadron shot down 30. In one strafing attack, Second Lieut. Alvin J. Jenson of Washington destroyed 24 Jap planes on the ground in one fighter sweep lasting about 4 seconds.

THE Marine air setup is highly flexible. Administrative unit is the Wing, but fighting is done by smaller units, usually squadrons, often flying as groups. Wings are usually independent units, able to attach themselves temporarily to Marine, Army or Navy units.

In the fighting in the Pacific, Marine planes not only work with the Corps' own ground forces to cover attacks and landings, but they work with the Navy whenever the need arises, and they do the same for the Army. Marines have done a great deal of flying cover for heavy Army bombers in the area. Sometimes they fly cover alone, sometimes the cover is a combination of Army and Marine fighters. It looks like a complicated proposition to get the planes of both services in the air at the right time for a mission. But the Marine setup is flexible enough to do it.

Their planes are chosen according to the kind of bombing that must be done. In most places in the area, enemy installations have to be hit squarely to do any good. Gun emplacements, for instance, will be spotted at points in the jungle, and unless they are hit on the head, the bombs do little more than break up some jungle. Hence the Marines' use of dive bombers, which dive directly on individual targets, straight through flak and without protection, let go their loads and race off at low altitude.

Despite the hazards of heading straight into a bunch of AA fire, the results have been remarkable. They have averaged

U.S. Marine Corps Photo

Marines use Consolidated Vultee Catalinas for rescue work and reconnaissance in the Pacific theatre, where there is far more water than land.

70 to 85 per cent of accuracy, and accuracy in this case means close enough to wreck whatever was aimed at.

One squadron of Marine dive-bombers, with the Sioux motto "Hensagaliska" or "Fighting Warrior" for their motto, put the Indian sign on the Japs by dropping 800,000 pounds of bombs on them without losing a man. During the Solomons campaign, they hit Jap gun emplacements protecting enemy airdromes with a record of 90 per cent accuracy.

The Marines get their training from the Navy, going through the Navy schools. When through they are assigned to the Marine Corps, and given further training in units. They are taught knowledge of what they cannot do, as well as what they can. They won't dog-fight with the Japs, for instance, because the Zeros can outmaneuver them.

One of the things they know about is Jap trickery. Frequently Japs set traps for Marine pilots by faking dog-fights. Over Rabaul, for instance, a Lieutenant saw what appeared to be a vicious dog-fight below. He dived down, saw the trap too late. The fight stopped immediately as he dived into their midst and 5 Zeros began firing at him. He continued heading straight down, outdistanced 4 of them, then levelled off and shot down the fifth.

Marine pilots get their knack for fighting in the air from a long way back. The anniversary for Marine aviation is May 22, 1912. It was on that date that First Lieut. Alfred A. Cunningham was sent to the Navy's aviation camp at Annapolis to become the Marine Corps' first aviator. He and First Lieut. Bernard L. Smith started a pioneer's job of organizing, instructing, testing, and advising for the Marine Corps, and by 1917 the Marines had 5 officers and 30 enlisted men in their air arm. This was increased to 282 officers and 2,180 enlisted men by Armistice Day.

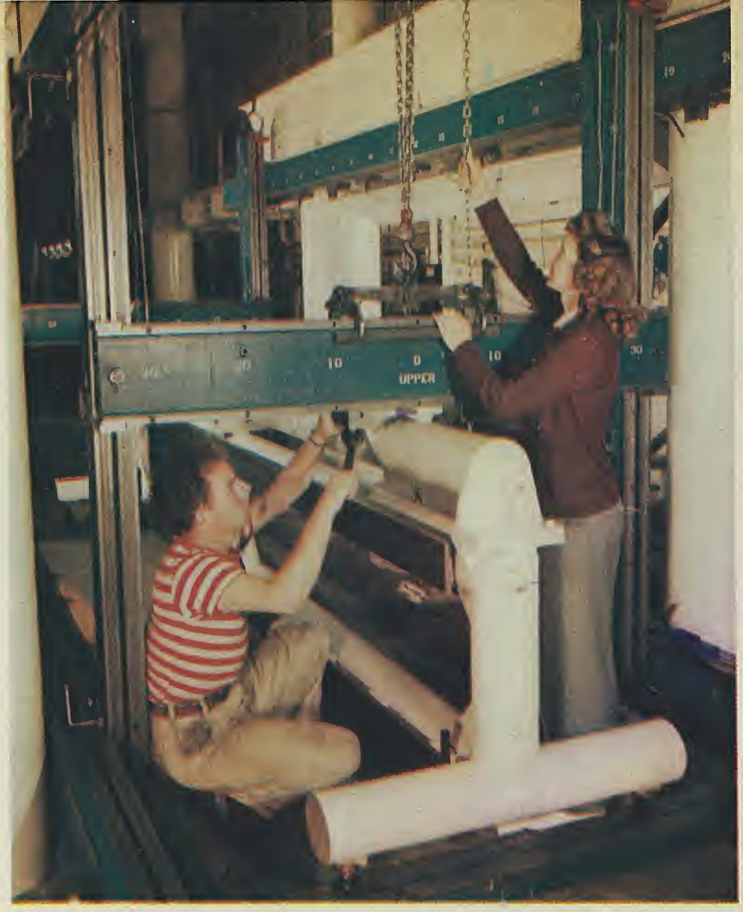
Their aviation work did not stop with the end of the war, because in the two decades after it, Marines fought in Haiti, the Dominican Republic and Nicaragua, taking their air arm with them. As early as 1919 and 1920, Marines in Haiti tried a modified form of dive bombing, doing the best they could with the planes of that era. Many students consider this the beginning of modern dive bombing. For five years thereafter, from 1927 to 1932, the Marines did some of the greatest military flying going on anywhere in the world at that time. With a well developed dive-bombing technique, they were showing for the first time how flying forces could operate with ground forces.

They carried out the first air attack directed by ground troops, evacuated wounded by air, transported troops, supplies and mail, made aerial maps — started many of the major operations which now play a vital part in our global warfare. When this war broke out, the tactics they had learned on a small scale gave the Marines the background needed for the tremendous operations they are now valiantly carrying on in a Pacific area of hundreds of thousands of square miles.

U.S. Marine Corps Photo

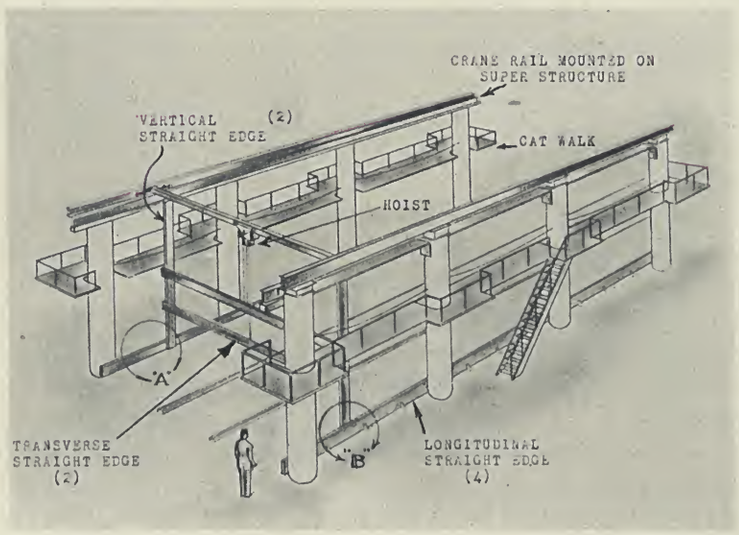
It was Marines flying two Liberators who made America's first reconnaissance flight over Jap-held Truk, enabling us later to bomb that fortress.

NEW TOOLING DOCK PROMISES REVOLUTION



WHEN the present war ends, Consolidated Vultee Aircraft Corporation will be able to get into production of new models in peacetime aircraft as fast as any other manufacturer in the world, and probably faster than most—thanks largely to its revolutionary new device known as the "Master Tooling Dock." The Master Tooling Dock could be technically described as a "three-dimensional positioning apparatus." Its advantage is that it eliminates a production bottleneck that has been a source of trouble to manufacturers of machinery since the beginning of modern industrialism. With this device, it should be possible to build light airplanes after the war faster and better than could automobiles in 1941.

In order to produce in volume any large machine like an airplane or automobile, it is first necessary to construct a special set of jigs and fixtures. The jigs and fixtures are gadgets called tools; they are used to hold all the required parts in rigid and exact position while the various processes of riveting, welding, etc., go on.



In aircraft work, some of these tools may be as large as a house. Yet their locating parts should be positioned within a tolerance of .005 inch. In automotive work, somewhat smaller tools are used, and they do not have to be so accurate; but they are still very difficult to construct. If the locating parts of a jig or fixture are not correctly positioned, the business of assembling an airplane or automobile becomes extremely difficult.

The Master Tooling Dock allows rapid, precise construction of jigs and fixtures formerly requiring hours and days of laborious hit-and-miss attempts, prior to success. These jigs and fixtures guarantee fabrication and assembly of interchangeable parts, the key to all mass production.

One reason why automobile models never varied much from one year to the next was this problem of tooling. Manufacturers simply could not afford the time and cost of creating a new set of jigs and fixtures each year. Hence they just made a few changes here and there in last year's model, and altered their tools accordingly.

Tooling was difficult and expensive because there was no universal apparatus for positioning the locating parts of a jig or fixture. Each new job was a brand new type of guessing game. It was sometimes a sort of minor miracle when toolmakers guessed right the first time. There were plenty of complicated instruments for the work. But unfortunately none of them was consistently accurate. That is why one large automobile manufacturer was recently obliged to spend more than a year developing a single jig that was accurate enough for aircraft work.

The new Master Tooling Dock of Consolidated Vultee now takes the guesswork out of toolmaking by reducing the process of finding three-dimensional locations to a series of simple and precise operations. These can be mastered by semi-skilled workmen in the course of a few hours' training. The Dock can locate any point within its boundaries to a tolerance of .001 inch, and it can decrease the amount of time required to do so by more than 75 per cent.

All this is accomplished by means of a series of fixed and movable straightedges situated within a large rectangular frame. By representing the lines of a grid plane system, such as is used in lofting aircraft, the straightedges can locate a three-dimensional point as easily as a draftsman finds the center of a sheet of paper when he draws diagonal lines from corner to corner. The entire set-up is based on the principles of plane geometry.

By means of the Master Tooling Dock assembly tooling can be started almost at the inception of an aircraft design. There is little or no need for special mastering fixtures and mock-ups.

TRAINING AIDS FOR AIRMEN

The Gunairstructor — an extraordinary device which "trains" the pilot of a fighter plane, without his leaving the ground, to track the enemy through the clouds and shoot him down unerringly.

How AFTAD Helped Speed the Building of Our Air Forces.

STARTING from scratch, and using just ordinary young humans as raw material, General Arnold in less than five years has built the largest and most skillful air force in the world — a precision-flying army of over two million men. Most of them had never seen the insides of an airplane before, and relatively few of them had ever travelled more than a day or two's distance by auto from their home town.

Historians will be telling for years how he did it. They will pause over One Park Avenue quite awhile. Park Avenue in New York is rated one of the fashionable streets of the world, and you wouldn't ordinarily think of it in connection with war waging. But at the foot of it, just below the endless rows of elegant apartment houses, is a high office building, and in that building is a floor where you must present credentials when you get off the elevator. This is the home of AFTAD — convenient word for Army Air Forces Training Aids Division.

AFTAD is many things; but it is basically a Brain. It collects and coordinates ideas on training airmen from all our Allies; it produces various other ideas of its own; and it has put the results all together in a bank of wisdom and ingenuity.

AFTAD does not train men; but if you yourself have that duty in the Air Forces, you can go to AFTAD and draw a draft on any of its resources.

You can pick its brain. You can wander through its stock of ideas, devices, machines, systems and compilations of experience just as you would go through a Sears Roebuck catalogue. You will find there an aid for almost every training problem. When you

are through with your tour, you can literally sit down and fill out an order blank—which you duly submit "through channels" — and you will eventually end up with the training aids that most effectively will help your base make skilled airmen out of ex-farm boys and soda clerks, in the shortest possible time.

If you are assigned this particular job of investigating the resources of One Park Avenue, you are probably what is called a Training Aids Officer. You are, in effect, a sort of technical assistant to the Director of Training at your base. If you are like Lieutenant Brown, you came on to visit AFTAD in New York because the Director of Training at your base wanted some special help.

"You're going on detached service for five days," said the Major to Lieutenant Brown one day in 1943. "We've got to push up our gunnery training here 30 per cent. The AAF is now getting all the combat planes and bombers it ever dreamed of. But it's still short on gunners. Find out what One Park Avenue can offer us to speed up training."

That is how Lieutenant Brown found himself in New York with a $7 a day expense allowance — of which he spent $3.50 for a room at the McAlpin Hotel, in short walking distance of One Park Avenue.

Lieutenant Brown sat down with Lt. Col. Howard J. Shipley, Chief of the Field Services Branch, and explained his problems.

"We're turning out hot gunners down at Blank Field," he said. "But we've got to handle more men. And we've got to put them through training faster. My assignment is to bring back any help AFTAD can offer my C.O."

Lieutenant Brown's tour of the exhibits at One Park Avenue began immediately.

He entered a vast room, filled with strange machines. Some of them looked as mysterious as the Machines of the Future which surround the Unborn Children in the *Bluebird.*

One of these was housed in its own special chamber — a room so dark that the Lieutenant's eyes had to adjust themselves, before noting that in the darkness sat the fuselage of a fighter plane.

The Lieutenant was invited to take the pilot's seat. His instructor simultaneously took a seat in a hidden pit below. "Now take the controls and fly her," said the instructor. "When you see an enemy plane, go into action. Ready?"

There was the whir of motors, and suddenly the Lieutenant had the illusion of being in the clouds. On a great screen in front of him the horizon swept ever toward him — then a Zero suddenly appeared in the distance. The Lieutenant tried for altitude, gained it, lost the Zero momentarily in the clouds — then found it.

This was no ordinary movie on a screen — it was a magic mirage, unfolding constantly in a three-dimensional reality as the Lieutenant changed the course of his own plane. Nor could he follow the enemy plane at will. However hard he tried, the Zero flew as if under separate controls — as indeed it was, for the instructor hidden in the pit below the pilot's seat was manipulating its course on the screen, and pitting his own skill against Lieutenant Brown's piloting.

"This machine," said the instructor when the demonstration was finished, "is the Gunairstructor. As you note, it is specially designed to give practice to fighter pilots, who must learn to aim their planes so they can aim their fire. You don't need one of these at Blank Base, where you are specializing only in flexible gunnery training. But I thought you'd want to see it."

"However," the instructor continued, "this Spotlight Flexible Gunnery Trainer is something you will need.

"In this trainer, a student gunner sits in an operational, wooden training turret facing a gunsight just like a gunner on a Liberator bomber. This turret has the same controls as the turret on a bomber. Through the gunsight, the student sees a spot projected on the wall, following an erratic and unpredictable path to eliminate guesswork.

"He operates the controls so as to follow the spot looking through the ringsight, and fires whenever the spot is centered in the ring of the gunsight. An automatic 'electric-eye' records the shots fired and the hits scored."

The Lieutenant was told that these machines were classified as synthetic training devices, in AFTAD terminology.

Hundreds of other kinds of synthetic devices are also being used for aircrew training, all designed to aid in teaching essentials of wartime aviation before risking lives in actual combat.

Sex in pin-up posters helps the boys remember.

IN the Gunairstructor, for instance, a student may fire a synthetic machine gun from a synthetic cockpit at a synthetic enemy airplane, and score simulated hits so actual that they are registered. In the "Link" trainer he may fly by instruments in a simulated airplane, without really leaving the ground. In the Spotlight Gunnery trainer he may operate a simulated turret and fire at a moving target that gyrates like the acrobatics of an enemy fighter plane.

These are only a few of numerous elaborate devices for speeding the teaching of gunnery and flying. There are almost as many for helping the teaching of navigation.

Today's airman must be a master not only of flying, but of many associated skills. Here, for instance, is a clever instrument to test a navigator's ability to determine drift. He looks through an eye-sight into a box; in this box there rotates an illuminated cylinder containing aerial map-photographs of land and sea. The rotation simulates ground speed; by means of a lever on the side of the box, the instructor sets the amount of side-drift and challenges the student to determine the drift angle. Ability to determine drift may well mean the difference between life and death, when a plane is heading for a small island far out at sea.

The exhibits of synthetic devices at One Park Avenue are not all of them elaborate inventions like the miniature "Planetarium," in which a navigator can be shown the stars shining exactly as they appear in the sky in any part of the world. Some of them are as simple as the dummy bomb

rack which holds the dummy bombs, for use in training a Liberator crew to handle, hoist and use the hot stuff. Some of them incorporate universally useful ideas that could be put to work by commercial manufacturers after the war.

AFTAD offers mockup models, for instance, which show on a large scale how a small device actually works. Do you know, for instance, what the principle of your automobile speedometer is, and how its parts look? And wouldn't it be useful to see a large scale model of the thing that you could readily take apart and as easily put together again? Then you'd know what to do, when the blame thing got out of order.

That is exactly the principle behind the large scale model of the Pitot tube, which governs the air speed indicator on a plane — a model AFTAD shows beside another model of an altimeter, which is the instrument that registers an airplane's height above sea level.

None of these devices is to be employed as a "trainer" — in the sense that it enables a recruit to train himself. The devices are not meant to supplant an instructor — they only assist him, and enable him to get better results with his classes in less time. Most of the devices are made by commercial manufacturers whose products, when found useful by the Air Forces, are promptly given space in the AFTAD "sample room."

After Lieutenant Brown had decided to recommend requisition of a Turret Trainer, some gunnery aids, an assortment of models, and a Mirrophone which enables men to hear exactly how their voice sounds to others on the radio (very useful knowledge to air crew members), he sat down to view a whole series of training films.

The Army Air Forces has carried the use of visual aids in teaching to such lengths — and proved their value so conclusively — that the eventual result may well be a revolution in some of our public schooling. AFTAD supervises the production of films for the AAF; in addition, it makes use of films produced by the RAF, the Navy, and also commercial producers, for the AAF Training Program.

PART of General Arnold's unexampled success in training over two million men in record time is due to the fact that every possible avenue of learning has been opened up. People learn differently — some most readily by hearing (if they are aural minded); others most easily by seeing (if they are visual minded); still others most readily by using their hands to take things apart and put them together again (if they are primarily gifted in motor processes). Unlike most of our schools, the Army has put all methods to work simultaneously, in combination. The ends gained have brilliantly justified the method.

Training aids at One Park Avenue include not only devices and plans—they also comprise a whole library of text-books, which duplicate in print all that is taught in motion pictures. And they include, further, a series of teaching aids that are called simply "Graphics."

When Lieutenant Brown walked into AFTAD's Illustration Section, he saw long rows of young men in the uniform of the Air Forces, busily engaged at easels in designing, drawing, and painting. In this department some of the most famous young artists in the United States are on duty, at a "wage" of $50 monthly and keep. The sight could make the art director of an advertising agency green with envy. Here are executed thousands of special wall posters needed by the Air Forces (in supplement to posters available from other sources) to keep training essentials constantly before the eyes of student airmen. The Graphic Section of AFTAD then arranges to send these training charts to Air Forces throughout the world.

Here, too, are invented such ingenious devices as training aids made from cardboard. The Cardboard Cockpit Trainer is an example. Before a pilot is allowed to check out for the first time in a plane that is new to him, he must put in many hours becoming familiar with the new cockpit and instrument board. The cardboard cockpit trainer of a Liberator, for instance, enables the young pilot to feel himself sitting right inside the bomber; there he must memorize the instrument board, controls, switches, and the various relationships of all these numerous details, before he ever leaves the ground. Since student pilots fly only an hour or two a day, these Cockpit trainers enable the pilot to use time constructively while he is waiting his turn at the actual controls.

The posters available in this department for teaching purposes range in subject matter from cross-sectional diagrams of machinery to summaries of first-aid fundamentals. By observing the progress of students exposed to the poster influence, AFTAD experts have been able to formulate expert conclusions on how to register ideas most effectively. A series of posters on the subject of poison gas recognition has undergone several revisions, in consequence. Once a phantomlike figure of death warned against forgetting a gas mask; it was found that the students unconsciously tried to forget the unpleasant picture, and thus the lesson. Revised, the series showed a Ferdinand-like cow chewing happily on corn, warning, "When you smell green corn — it's phosgene gas." Later a rookie was pictured munching scallions, and the poster announced that "When you smell onions — it's mustard gas." The latest series, as the AFTAD Bulletin recently announced, now "employs those psychological principles proved by commercial advertisers to be most effective." The advertising agencies, in short, early discovered the miraculous results that are produced when products of whatever nature are discreetly linked to sex. AFTAD experiments show that the agencies did their research to good avail. The Lewisite poster of today offers a pin-up girl picking geraniums in clothes that provide none too much coverage, and the legend says, "When you smell geraniums — it's Lewisite gas." Not only do the boys remember the poster — they pin it up with other members of the gas-girl series in prominent spots in their barracks.

At the end of his five-day exploration of these and kindred exhibits, Lieutenant Brown was able to take back to base a whole series of recommendations for equipment that would ease his C.O.'s task, along with fat catalogues that would permit the Major to add to the recommended list of training aids to be acquired if he desired.

Today the Major is a full Colonel, in recognition of his success in speeding up the flow of successful graduates of basic training at his base; and Lieutenant Brown is a Captain.

Liberators of the Eighth Air Force over France.

B-24 crew in England ready for D-Day take-off.

Turning D-Day Into Victory

AIRPOWER has been a vital instrument in keeping losses low in our landings in France. "Most astonishing thing in the air operations accompanying the invasion of France was the success of heavy bombers against Germany's heavy coastal defenses," said E. Colston Shepherd, British commentator. "The majority of the guns never fired — all seemed to suffer equally from highly concentrated bombing."

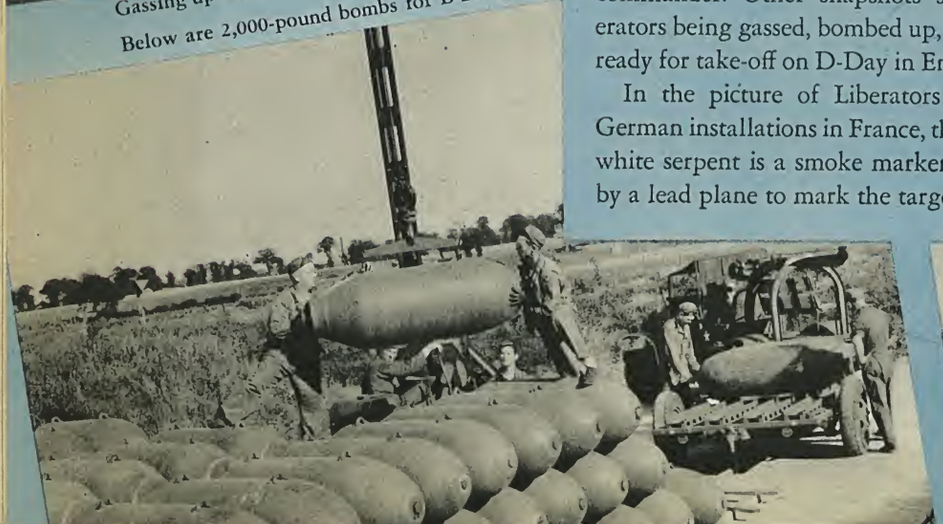
And General Sir Bernard L. Montgomery said on August 21 when the German rout in France had turned into Nazi disaster: "As soldiers we all want to pay tribute to the Allied Air Forces. Without their support we soldiers could have achieved no success."

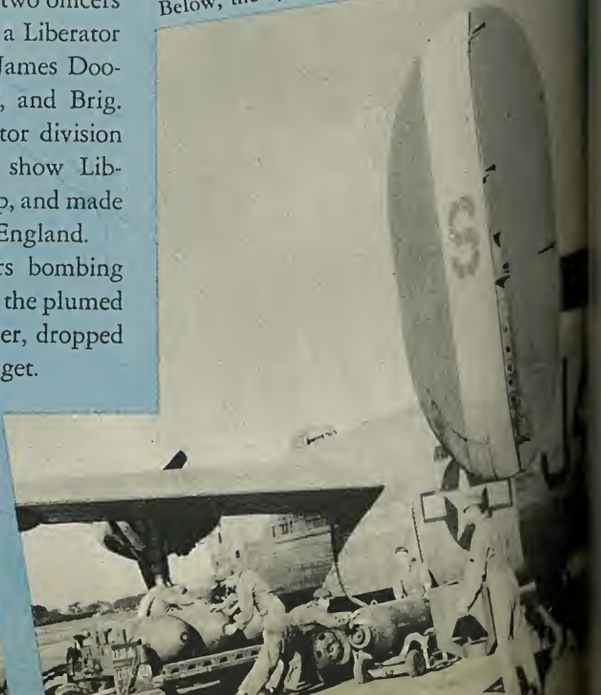
Most of the pictures on this page showing American airpower in action are from snapshots taken in England, and sent by air-courier to Washington. The two officers conferring during inspection at a Liberator base in England are Lt. Gen. James Doolittle, Eighth Air Force Chief, and Brig. Gen. James P. Hodges, Liberator division commander. Other snapshots show Liberators being gassed, bombed up, and made ready for take-off on D-Day in England.

In the picture of Liberators bombing German installations in France, the plumed white serpent is a smoke marker, dropped by a lead plane to mark the target.

Generals Doolittle and Hodges talk Business. Below, the 2,000-pounders are loaded in a B-24

Gassing up a B-24 in England on D-Day morning. Below are 2,000-pound bombs for B-24 delivery.





Plane Talk in many languages

These advertisements are part of a series sponsored by Consolidated Vultee Aircraft Corporation for placement by the O. W. I. in neutral countries throughout the world. Similar advertisements are sponsored by the Company, in cooperation with the Coordinator of Inter-American Affairs, for placement in South America in English, Spanish, and Portuguese.

Från "flygande jeeps" till luftjättar
LIBERATOR... 4-motorigt bombplan
LIBERATOR EX...
CORONADO... marinspaningsplan
CATALINA...
VALIANT... skolflygplan
VENGEANCE...
RELIANT... skolflygplan
SENTINEL...
EFTER KRIGET kommer Consolidated Vultee Aircraft Corporation att kunna leverera fredliga motsvarighe-
ter till dessa flygp
babyplan för privat
transoceana frakt- och
CONSOLIDATED VULTEE AIR
San Diego, Calif.
Vultee Field, Calif.
Tucson, Ariz.
Forth Worth, Texas
New Orleans, La.
Nashville, Tenn.
Louisville, Ky.
Wayne, Mich.
Dearborn, Mich.
من "الجيب" الطائر إلى سفن الهواء الضخمة
ليبريتور اكسپرس — طائرة نقل
ليبريتور — قاذفة بأربعة محركات
كاتالينا — قاذفة دورية
كورونادو — قاذفة داورية
فنجنس — قاذفة انقضاض
فاليانت — طائرة تدريب أساسية
سنتينل — « الجيب » الطائر
ريليانت — طائرة تدريب للملاحة
تعادل هذه الطائرات ، من الصغيرة التى يملكها أفراد لاستعمالهم الخاص ، إلى الضخمة التى تعبر المحيطات حاملة البضائع والركاب .
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Wayne, Mich.
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Allentown, Pa.
Nashville, Tenn.
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عضو فى مجلس انتاج الطائرات الحربية

← Advertisement for Swedish edition of Reader's Digest

Advertisement for Arabic → edition of Reader's Digest

PRINTED IN U.S.A.

Plane Talk

NOVEMBER - 1944

...g a Liberator's top turret guns

Wright Field and the American Future • Great Bombers to Guard the Peace

No Medals for Weather Recco • Interlude, B-24 • Training the Foreign Legions

Plane Talk

If you wish to share your copy of Plane Talk with a soldier in the war theatres, 1st class postage is required (15¢). You may re-use the envelope in which your copy comes to you by pasting on a label addressed to the APO number; seal the envelope. The magazine may be mailed, unsealed, to a U. S. A. address for 3¢

NOVEMBER, 1944 • CONTENTS • VOL. II, No. 6

PUBLISHED BY CONSOLIDATED VULTEE AIRCRAFT CORPORATION

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Wright Field has supervised the spending of some fifty billion dollars to build American airpower, with results our enemies now know..... 1

Is It Dangerous?

Flying internationally with ATC is today just a casual adventure for thousands—and Fred B. Barton tells you how to meet it..... 5

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"A Long Way From Home"

THANKS *partly to the fact that so many U. S. readers send their copies of* Plane Talk *to friends in the armed forces, we get letters regularly from boys in Europe, Asia, Africa, and the far islands of the world. Every one is answered personally; many are so interesting that we should print them, if space permitted. All are helpful, for they give the editors a close contact with men in the air forces they could enjoy in no other way.*

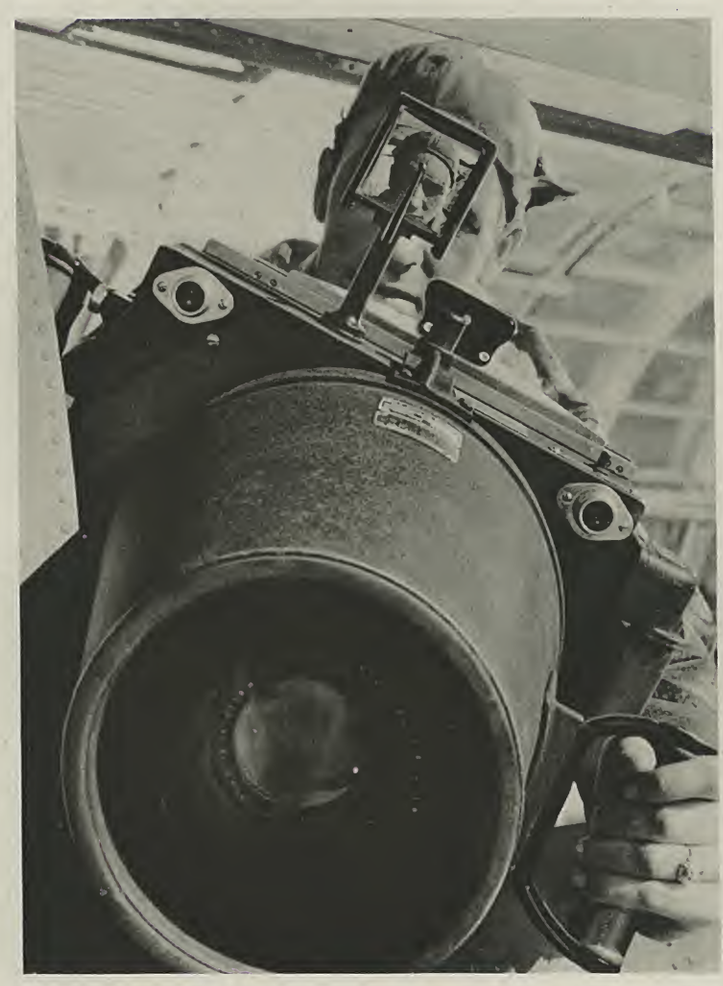
Curious to know how one lad in a far off corner of India had made his own acquaintance with Plane Talk, *we wrote to ask. Sergeant W. H. Moore replied, "It was loaned to me by one of my buddies in the barracks. When I questioned him about how he obtained it, he told me that his girl back in the States had secured the copy somewhere. He, in turn, has passed it around among the men until it is thoroughly read. It is a mighty clever magazine."*

Strangely enough, of all the things our airmen like to read, top vote seems to go to articles about themselves. Lieut. Richard S. Reeves, whose water colors of China were reproduced in our September issue, perhaps explains why. He wrote us in October:

"I was driving in a jeep over an old dirt road to my barracks, in company of another Naval Officer, and we stopped to pick up a young Army Lieutenant who was all dressed up and in a hurry to get some place. In his hand he held the September Plane Talk, *and no sooner did he get in our jeep than he turned to the article on China by Fred Barton. He was on his way to show it to his girl, a nurse at the hospital, and seemed quite impressed to know that I did the illustrations. That's just one example of the thrill most of the fellows out here get when they receive a magazine containing an article about the 14th Air Force. These fellows are a closely knit bunch and like to read things and see pictures about what they're doing. It makes them feel that the people back in the States are thinking about them, which is a good feeling to have, Mr. Editor, because this place sure is a long way from home!"*

Edited by Hill and Knowlton for the Consolidated Vultee Aircraft Corporation and published every other month. Text and pictures have been cleared for publication with Government authorities. Text of any article contained in the magazine may be reprinted with or without credit to Plane Talk. Copies of most pictures, except those credited to commercial news agencies, can be made available to editors upon request. While manuscripts are not solicited, first hand accounts of experiences by men in the air forces at the fronts will be given careful consideration. All correspondence and address changes should be addressed to the office of Hill and Knowlton, Room 3301, 350 Fifth Avenue, New York 1, New York.

WRIGHT FIELD AND THE AMERICAN FUTURE



Technician at Wright Field testing aerial recco camera.

by Edwin F. Dakin

THE young Lieutenant, home from the wars with his nine oak leaves, pointed along the Miami valley horizon.

"You are now looking," he said simply, "at the center of the world."

We had climbed up the gentle Ohio hillside for a view of the acres of runways, hangars, barracks, and laboratory and office buildings that make up the Wright Field of today. Wright Field has just expanded again, to swallow up the greater part of adjacent Patterson Field, where the Air Service Command had its operating headquarters. All this is now Wright Field's area A; its area B is the former Materiel Center. The expansion reflects late 1944 changes in organization. ASC has been absorbed, along with the old AAF Materiel Command, into a great new composite called the Air Technical Service Command.

The Treasury decides on monetary policy in Washington, but keeps its gold in the Kentucky Hills. The ATSC, in rough parallel, is ruled from the Pentagon Building, but makes Wright Field its operating base, and the storehouse of its lore.

Here, in short, is amassed all of America's knowledge of what makes military airpower. Thus Wright Field stands as America's inner bastion — the greatest of its kind in the whole world. That is what makes it a new world center. In this air age, when no nation can retain its independence without the support of dominant airpower, such a center has a personal meaning for millions all over the globe.

Strange misconceptions are still current regarding what Wright Field actually does. Many believe, for instance, that it designs airplanes. It does not. Some believe that it tries to compete with manufacturers of aircraft, by making products of its own. It does not. One of its main jobs, instead, is to help manufacturers in their own undertakings, even to the point of subsidizing their research, if that seems desirable. Still others think that Wright Field specializes chiefly in creating miraculous gadgets out of the dream world of Buck Rogers. This, too, is a misconception. The gadgets at Wright Field make fine copy for reporters, but are not the clue to the real significance of its operations.

Until last year operations at Wright Field were largely entirely shrouded in mystery. Then the powers-that-be initiated a vital change. They recognized, in short, that in a nation where public support of a project depends on public knowledge of it, secrecy can be carried too far. Thereupon Wright Field was given an able public relations office, headed by one of the Army's ablest public relations men, and reporters were invited in. During the first grand rush, it was perhaps natural that some reporters went into small-boy ecstasies over the gadgets; while others described Wright Field in words indicating that the aircraft industry itself had little function beyond putting Wright Field's designs into production, after hiring ex-manicurists and ex-waitresses to operate the assembly lines.

Such snap-judgment effusions have been embarrassing. Time and more knowledge will doubtless amend them. Meanwhile, the easiest way for an observer to understand what Wright Field really does is perhaps

to study it as a procurement agency for the Army Air Forces. That is, it buys all the equipment the nation needs to create a preeminent airforce, spending — over the last few years — at the rate of some 75 millions a day. In the course of purchase, it tests this equipment to assure its proper performance. Then, equally important, it distributes the equipment to the AAF wherever needed, throughout the world, and maintains it.

Like other large buyers, Wright Field does not go out into the market and take just what is offered. Great agencies like Macy's, and Sears Roebuck, write their own quality specifications for what they want; and manufacturers then produce merchandise specially to meet their requirements.

Wright Field operates very much in the same way. It buys only products that meet its specifications; and it has enormous testing laboratories to make sure the requirements are met. It tears airplanes apart, for instance, and tests every part, just as a department store tears open mattresses, to determine their quality.

Wright Field's methods of procurement can be illustrated by briefly citing the development of the new Dominator (B-32) and the Superfortress (B-29). These are "sister" ships, the second already in action, the first soon to be. They were designed by two different manufacturers — the B-32 by Consolidated Vultee, and the B-29 by Boeing — to meet the same set of AAF requirements. These requirements were written down at Wright Field in 1939 and sent by confidential messenger to several manufacturers. Only two of the manufacturers felt able to submit plane designs which would meet the technical specifications.

Now those specifications did not tell the manufacturer just how to design the plane; for the most part, they merely outlined the performance the proposed plane must deliver. When Consolidated Vultee and Boeing submitted designs found acceptable, Wright Field told each of those manufacturers to go ahead on an actual model, and entered into a contract to buy the finished result.

Just as a large department store works with its manufacturers in modifying their designs from time to time in accord with its ideas of developing needs, so does Wright Field. Finally, when the finished product is delivered, and Wright Field has tested it thoroughly, further modifications may be required before the order for quantity production goes through. Sometimes, if things must be rushed, quantity production may be ordered even before the first model is completed. One thing is certain: changes in the design will continue even when the plane is being produced in quantity. Regardless of all tests, no one is sure of a battle plane's performance until it actually goes into battle.

Now it is obvious that it is a very important part of Wright Field's business to know many years in advance about air power potential. For it takes from four to five years, even under today's war-time pressure, to carry a plane forward from first design to full production. Many nations besides the United States are working on airpower developments. If the United States is to retain its preeminence in the air, it is very important to know — when a design is adopted — that five years thereafter it will still be out in front of all competing developments launched by other nations.

It is on this point that much of the research work at Wright Field is focussed. Says Brigadier General Carroll, who is Chief of the Engineering Division:

"We shall probably win this war with American planes which were designed before the war ever started. And that will doubtless be the way with any war that ever comes. We must work far enough ahead always to have at least a two-year jump on any potential enemies. If this is maintained, it means permanent safety for the United States."

In reaching for this goal, Wright Field does much pure research of its own. It also maintains the closest liaison with every manufacturer. A great deal of its store of knowledge, indeed, represents a summation of wisdom developed by all the various members of the aircraft industry. No one manufacturer, however, can know all developments affecting his work that occur all over the world. Wright Field through its own many contacts can readily keep him informed, insofar as this does not involve revealing a confidence from any other American manufacturer.

Is there a new metal available? Wright Field wants American manufacturers to know about it immediately. General Carroll, indeed, insists that most of our future progress in airpower depends on the development or discovery of new and better materials. The turbo supercharger, for instance, owes much to the fact that research brought a better alloy into being. The jet propulsion plane is now practical partly because of this same alloy. Hundreds of similar instances could be cited. New plastics, no less than new alloys, are now in being that give promise of almost countless advances in the future.

General Carroll — the idol of a devoted staff — tells visiting reporters that there is a sort of four-year cycle in research and development, as if trends came up on a revolving wheel periodically. An idea comes along, is worked on, is found impractical for the present, is laid aside, is brought to life again some four years later by another idea that gives it impetus — perhaps a new material that makes it feasible. The turbo supercharger idea had to go around the wheel five times, before all factors combined to make it a practical achievement.

In its job of encouraging research, Wright Field will go far to advance the work — and fortunes — of any individual or corporation with an impressive new idea for developing our air power resources. If you are a lone inventor with something real to offer, you can go to Wright Field and get a hearing. If you survive examination, you will be helped to develop your invention — probably by the simple pro-

New materials mean progress. Here is a BT-15 using impregnated glass cloth with balsa wood

cedure of introducing you to a manufacturer. The manufacturer will be given an order enabling him to produce a working model of your device.

Actually, if you are a smart inventor, you have probably gone straight to a manufacturer in the first place, and it is the manufacturer who comes to Wright Field to present the idea. If engineers there see possibilities in it, the manufacturer will in effect be subsidized in its development by agreements to purchase a completed model. This will eventually be put through all the various Wright Field tests to establish its performance, and if it makes good, orders for many more may follow.

Wright Field test pilots in operations room.

To pursue such work, Wright Field is given an annual appropriation by the Army, from Army funds provided in Congressional appropriations. During the present war, appropriations have been whatever asked for. Previously, Congress was hardly to be accused of undue generosity. No one at Wright Field will speak of the political matters that are regarded as being beyond a military man's province. But no visitor can come away without himself carrying the conviction that the national interest and generous appropriations for Wright Field operations will hereafter, for all time, be synonymous terms.

The word "Field" is in a way unfortunate; it inevitably suggests a picture of mere runways and hangars. Actually, Wright Field is a city of workers, with an airfield attached. Thousands pour in and out daily, the majority of them civilian workers employed for their special skills. Many, both civilians and officers, live huddled together in the rather unaesthetic confines of Dayton, going back and forth in buses jammed to the guards as in all war-boom towns; others have been fortunate in finding homes through the adjoining countryside, as beautiful and picturesque as any suburban area in America. All of them represent the result of a combing of talent and genius, conducted all over the United States.

SOME reduction in such a staff would be a natural post-war expectation. But only a post-war madness would reduce it to its earlier skeleton form, and scatter the human talent to the winds. In the words of Major General Echols, Assistant Chief of Air Staff:

"American airpower ultimately comes down to superior engineering and designing, plus superior manufacturing. Men — however brave, well-trained or physically fit — cannot win battles with inferior equipment. Our first function here has always been the same — to look ahead, to know everything in the world concerning aircraft development, to strive to make American equipment the best. Such a mission involves nearly all the sciences from metallurgy to astronomy, from chemistry to areodynamics, from physics to physiology. Though often hampered by inadequate appropriations, we have kept AAF technical development out in front. And we regard it as a job without end."

It assumed that hereafter the United States will never stint funds for research, both at Wright Field and in the plants of all the various aircraft manufacturers. But the time of reducing production of some types of war planes is already at hand, and Wright Field's orders for AAF equipment are now definitely on a decline.

Since 1939, when Congress began loosening pursestrings to make the building of a preeminent American airforce possible, Wright Field, as headquarters of the Air Technical Service Command, has placed over $50,000,000,000 of orders. Today it has in effect some 11,000 contracts covering over half a million items, and from these depend innumerable subcontracts made by prime contractors with other suppliers.

Its purchasing still continues at the rate of $35,000,000 a day. Once Germany is conquered, the decline begun in recent months will be accelerated. "Contract termination" is a subject that is wrinkling brows at Wright Field, as well as in the aviation industry. The Army is particularly concerned in giving fair advance notice of war contract terminations to the employer and worker alike, and then in putting the manufacturer promptly into a position to start other kinds of production.

Here and there, in what might be called the lunatic fringe of viewers-with-alarm, has appeared an argument that the Army should go on buying its guns, planes, equipment and armament indefinitely, at past prevailing rates. Not because they will still be needed in such continuing volume, but because their manufacture makes for "prosperity" and "sustained employment".

To such an argument military leadership opposes a purely functional concept of its delegated authority and its job. That job is to prepare for the exigencies of war adequately, to win the war if it comes, and then to release its war-time draft on the total resources of the nation in as orderly and rapid a manner as possible.

Various estimates have placed the cut in AAF equipment needs at something around 40 per cent, when we are through with war making in Europe. However that may be, it seems clear that — as workers are released from their aircraft jobs — so will be a corresponding volume of raw materials for fabrication in other forms. To bring the released workers and raw

The laboratories hold vital American secrets.

materials together in non-war production is the function not of the army, but of the civilian economy.

As Lt. General William S. Knudsen, Director of ATSC operations, has phrased it: "The heart of the termination job, as outlined in Washington and operated at Wright Field, is to pay the manufacturer his money as quickly as possible, and then to get government owned property immediately out of his way, to release his floor space. This means he is then free to go ahead into reconversion, with money in the bank and the opportunities of civilian production wide open before him.

"In the past, it's taken sometimes five to six months to wind up a contract. We hope to cut that at least in half. It can be lots shorter still, if industry will be forehanded in prompt preparing of audits and accounts. With all the required figures in hand, we can often present a check in ten minutes.

"For instance, a manufacturer can get a check immediately, when those figures are ready, for all work completed up to the moment of contract termination. In 30 days he may be allowed up to 90 per cent of his estimated costs on work in process on materials in his inventory, as an advance against final settlement. And in 60 days the government will take off his hands all his unprocessed materials if he wants to sell them that way, instead of using them himself or finding another buyer.

"If he still needs ready money to get his plant going on commercial production, the government will underwrite up to 90 per cent of a T-loan (T for Termination) which he may negotiate at a bank. If some one of his subcontractors delays an accounting report, the prime contractor can still get a complete settlement, while the subcontractor is left to deal with Uncle Sam directly. In helping speed the accounting process, the contractor may incur various expenses that will be allowed as costs by government."

In working out such methods of handling the contracts, the War Department has followed almost literally the recommendations of the study prepared by Bernard Baruch and John Hancock. The so-called "uniform termination clause" now used in all fixed-price contracts is more often referred to as the Baruch clause.

Today the Air Technical Service Command is training over 3,000 selected officers to handle the involved details of contract termination fairly, swiftly, and without waste motion. Courses for the purpose are conducted in such institutions as Harvard Business School and the Army Industrial College at Washington, D. C. Says Maj. Gen. Bennett E. Meyers, deputy director of the command:

"Wright Field now has first priority on officers for this job, wherever they may be located through the world. Our choice falls on men who in civilian life were successful bankers and corporate executives, recognized lawyers, property managers, and production experts. Once trained, they work in teams composed of a negotiating officer, a salvage officer, a legal officer, and a production officer. At least one of them is a qualified accountant.

"We are not only training qualified men to handle the Army's part of the termination job. We are also offering to manufacturers all the information at our disposal that will help them in winding up the contracts at their own end. The faster the manufacturer can function in listing his inventories and in submitting his statements and his subcontractors' bills, the more efficiently we can operate. In each of our six procurement districts, therefore, we invite manufacturers to attend meetings, or to send representatives there, where we show them the steps they should take in preparation for termination, and what requirements must be met. Sessions vary from one day meetings to courses that last over several days."

It is not in General Meyers' province to promise workers remaining on production lines now that they can still count on jobs after Germany's defeat. He does say to the workers in war production:

"Stay on the job. We need everything you are making. The fact that we plan for future contract terminations now is – far from being your reason to quit – a sound argument for staying on your job. We are doing everything in our power to assure that, when we do finally terminate contracts, employers can get quickly into the clear, and be in a position to open jobs in commercial production promptly."

Regarding Wright Field's relationship with the aviation industry, one thing seems clear. Both in its administration of contracts, and in their termination, the Air Technical Service Command is determined to be eminently fair to every contractor and subcontractor in the industry. For the future of the industry depends on that fairness. The Air Forces are warmly concerned with this future, for a strong aviation industry post-war is a vital requirement for a strong air force. In the words of the top authority, General H. H. Arnold:

"The aviation industry has already done a magnificent job and in the years ahead will contribute mightily to the research, experimentation and foresightedness necessary to maintain leadership. Measured in terms of crews, of aircraft and of supporting industry, ours is the most modern and powerful airforce in the world. We intend to keep it so."

On the importance to America's future of continuous air power development, the ATSC and the aviation industry are fully agreed. Nor do they doubt that the American people will henceforth find ways to support the air power development that the nation's security in a troubled world requires.

IS IT DANGEROUS ?

By Fred B. Barton

SOME of my friends seem to think that I'm leading a dangerous and racy life in my flights from war theatre to war theatre. Pshaw! It's for the most part just uncomfortable. And by the time you read this, the Air Transport Command will even have reduced many of the discomforts. I hear that the hard metal seats in some of its planes are already being replaced with upholstered chairs, and on some of the planes G.I. stewards are actually passing out lunch to passengers and giving them typed briefs of the latest radio broadcasts.

Maybe the British had something to do with this. The RAF transports and the British Overseas Airways have been trying hard — with an eye to post-war developments — to establish a British record for making passengers happy. The American reputation mustn't suffer by contrast. Important people are flying these trans-ocean routes nowadays, and the impressions left with them may have a lot of post-war impact. So improvements in the American service are being made constantly. Some of the details I set down here may be outdated by the time you read them.

Unless you are very important indeed, you probably travel under the Army's No. 3 priority. As you probably know, No. 1 is brief and limited — for the White House only — including its representatives. No. 2 takes in Generals, Colonels and such. No. 3 takes in war correspondents and others permitted to travel alone. Wounded soldiers being flown back home take a No. 3 priority which is actually a No. 1, since once loaded they travel straight through without change.

Today the flying is mostly routine. Six nights I have spent in high-speed airplanes all under 1944 war conditions, all but one representing long jumps between continents. All but one were over oceans. And all were uneventful. Let me hit the high-spots of today's long distance night flying for you briefly.

Night is the preferred time for such hops — for the stars greatly aid navigation.

You don't smoke on these cargo ships being used today — at least, not in the passenger-and-freight compartment. They're loaded with bomb-bay gasoline tanks and the fumes float back in the plane. A couple of you at a time may walk forward to the crew's compartment for a smoke, if you must. On Clipper planes, which have a pressure cabin, you can smoke at any time except when landing or taking off.

Luggage is a problem. The arbitrary limit is 55 pounds, or 25 kilogrammes. On the Clipper flight from New York to London that 55 included everything: suitcase, toilet-kit, briefcase, typewriter — everything but the topcoat you carry over your arm. The Army is more lenient: it weighs only your bags and not your musette bag, typewriter, gas-mask, helmet "or anything else you carry in your hands." Even so, 55 pounds gives not a great deal of leeway, if you try to dress for two widely different continents.

You'll be wise to carry a coathanger. There is generally a place to hang up your best coat, and if you're sleeping on the floor, you will probably want at least a sweater.

The handiest bag you can fly with, if you can find one, is the zipper affair so

beloved by all flying personnel. It holds plenty, packs tight, and even when crushed and roped and sat on — as your bags will be crushed and roped and sat on — it still holds together. The Army's musette bag, which hooks over your shoulder, doesn't hold very much, but you'd better pick one up if you are eligible for it. It's a place to park a change of underwear, your toilet kit, and some wool socks.

On long trips you'll fill your canteen with water and lash it to your belt. A few individual-sized cans of grapefruit juice make good traveling companions, too.

Keep some things on your person. These especially:

Your money belt. Perhaps you travel with vast funds (everybody in war time has to be his own banker, because you can't depend on cabling home and getting money in a hurry). Stop in at the Army's finance office and buy some Indian rupees before you enter India, if you care to: it saves time when you get there. Carry some American bills, but keep your uncashed funds in U.S. post office money orders: cheaper and faster to cash than travelers' cheques.

Your passport. If you travel under an AGO card — the Army's identity card — you escape some of the nuisances of civilian travel. Even so, your passport is important. You will probably need it to get back into the U.S.A. Don't let it expire, and don't lose it. You'll hear tales of black markets in American passports, paying hundreds of dollars for your little green-bound volume.

Your health record. In a way this is the most important document of all. It establishes the fact that you have been duly immunized against smallpox, typhoid, typhus, tetanus, cholera, yellow fever and bubonic plague — one or several or all of them. Guard this slip-of-paper with your life. Otherwise you may be quarantined for a week or two and given new yellow fever shots on entering India. One U.S. soldier lost his health record *twice* and had to take the whole series of shots three times. Don't be dumb like that.

Food is generally provided, but it does no hurt to carry a box of crackers from any well-stocked PX (post exchange). And if you have run across any peppermint life-savers, or chewing-gum, try to have enough to pass around to your fellow passengers. They'll appreciate it.

Bring along a magazine or book. The new reprints in the midget size invented by the Council on Books in Wartime give you standard novels in literally vest-pocket compactness.

It goes without saying, however, that you will carry no books or magazines, *or any other kind of written or printed matter,* which you have not first submitted to the censor before taking the plane. Do not, above all things, carry uncensored letters with you to mail to some friend's wife or buddy in the country you plan to visit. Submit your briefcase, your personal diary, and any papers you are carrying to censorship several days before you plan to leave. They will be returned to you in a sealed envelope, with perhaps a few annoying excisions by an awkward razor-blade.

If you carry a map with you — and by all means do — the safe kind seems to be one issued by National Geographic Society. It is available to you, usually free, at Army headquarters.

At night you'll do little looking out of the window, although it's fun to stare out at the peaceful stars, if sleep doesn't accept you. If your plane makes a stop for fuel and passenger comfort, say around midnight, you'll find a hot breakfast waiting for you — better than the sandwiches put aboard the plane; free. When you land in the morning it may be nearly noon. (One recent overnight hop shoved the time ahead three-and-a-half hours while I slept.)

You'll probably sleep in your clothing, so give some thought to comfort. Nights are generally cold at flying altitude (and your pilot may choose height, especially over hot countries, because the engines operate better when cool). They may turn on some heat, in a spasmodic kind of fashion. But if you sleep on the floor you'll find it drafty. If you are one of the wise people who change to wool underwear for any night trip of indeterminate kind, you will wake up in the morning without a runny nose, while those about you, wearing the so-called "athletic" underwear which has made Americans slaves to indoor heat, will have caught colds.

You won't find a great deal of room for your legs. Perhaps the center of the plane is piled high with cargo and handbags. Perhaps you can curl up — how cosy it sounds! — on three bucket-seats.

Get yourself oriented before you turn in for sleep, so that if you have to go anywhere during the night you'll step on the minimum of outstretched feet. You probably will not be sick: let's hope not. If you get thirsty, or if you wish to visit the chemical affair at the rear of the cargo compartment, try to stumble over as few people as possible. Of course, you carry a pocket flashlight. (My friend the engineer of a British submarine on which I spent four days, says, "That is one of the accomplishments of this war, with its blackouts. It has taught people to carry a pocket torch.")

Waking up in the morning on a cargo plane is an experience in casualness.

The gentleman across from you slits a hole in the top of some canned grapefruit juice and swallows his daily vitamin pill or aspirin, or whatever. Another gentleman leans back on the blanket and administers to himself some nosedrops. A third feels his chin thoughtfully and wonders whether to shave with his canteen of water or to wait. Decides to wait — too much trouble.

Unloading a Liberator express in India. ▶

to clean the razor-blade with limited water.

Traveling toward the east has brought you to your destination always at a time later than your watch tells you it should be. You have been cheated out of a few hours by the mysteries of standard time. You wonder vaguely what it will be like to fly some day soon across the International Date-Line and have a whole 24-hour-day handed back to you, un-named, unrestricted, and extra.

Of course you *expect* to fly across the International Date-Line. The airplane, you have decided, is here to stay. You intend to stay, along with it.

Perhaps that brings us back to the matter of safety in the air.

THERE is a grim book issued to Air Transport Command pilots who travel long and lonely routes. It is called "Survival" and, as its title suggests, it gives practical information for avoiding death by hunger or thirst or enemy beasts, in any part of the world where men and airplanes may be forced to land. Look over a copy sometime and remember that brave men died because of the lack of that information and the simple supplies it recommends for any long-distance trip.

Reading the book will impress on you never to fly any great distance, or run the risk of an emergency landing, without sunglasses. Sun blinds the eyes, either in winter or in summer. You'll want your canteen of water too, regardless of what supplies the airplane may provide. And a first-aid kit hitched to your belt. And a watch and compass. And a knife with a stout blade. And emergency rations — they'll sell you some at the airport, no doubt, for about 30 cents a meal.

If you travel over the Hump in the Himalayas — that connecting link between the forces fighting the Japs in China and our line of supplies working up from India — they'll lend you a parachute with a jungle kit. The kit includes a .45 revolver, a watch, a compass, and compressed rations.

You may as well talk with a few people and acquire a rudimentary knowledge of how to handle a parachute. Test out the straps beforehand and make them fit. Dive head-first, if you remember it, and take up the jolt on your shoulders rather than your crotch.

The ATC believes generally in staying with the plane rather than separating and taking to the 'chutes. You'll find such things, therefore, as snowshoes in the plane's equipment — not enough pairs to march all the passengers and crew to safety across snows (when the plane travels over snow) but enough to send two men for help. If you fly over water you'll have your individual Mae West, soft and yellow and comfortable to wear, and quickly inflated either by your breath through a tube or by a lead capsule of CO_2. There'll be a yellow rubber-and-fabric life-raft too. The steward will instruct you to take off your shoes and knot the laces through your belt, if it proves necessary to ditch the plane — land in the water, that means. Thereby you avoid tearing holes in the rubberized fabric with your heels.

But you won't think overly long about danger. All travel, all motion, is risky. I am old enough to remember a ghastly accident back in the early 1900's when a beautiful young debutante fell from her carriage. Her long hair caught on the carriage step and she was dragged down the street by a runaway horse. Isadora Duncan died in much the same way — her flowing scarf caught in the wheels of her automobile, and broke her neck.

I remember, too, some accidents that attended the mass movements of people on excursions. The General Slocum disaster, when a boatload of children returning from a Sunday School picnic found themselves suddenly in a holocaust of fire and perished — hundreds of them — in New York's East River, and well within sight of help.

Yes, and I recall hundreds of newspaper headlines screaming about motorcars that stalled on train tracks, and motorists who collided with each other, and other vacationers who paid for their last good time with their lives. And the end is not yet. Automobile accidents in any pre-war year, plus industrial accidents in our factories for that year, probably equalled — perhaps even exceeded—America's military deaths by shooting and drowning and disease in 1943.

Whether we wish to or not, we must all follow Nietzsche's threadbare advice. We are forced to "live dangerously", if we live today at all. Flying, to me, is no more dangerous than any other activity.

You recall, no doubt, Mark Twain's tongue-in-cheek advice about this sort of thing. He was discussing railroad travel. Riding in trains *is* dangerous, Mark Twain admitted. Last year (he quoted the figures) several hundred persons were killed or injured because of railroad accidents. What a pity! But then, he suggested, in the same twelve months many hundreds of thousands died in their own beds. And so, he concluded, if you don't want to die, for heaven's sake stay out of bed.

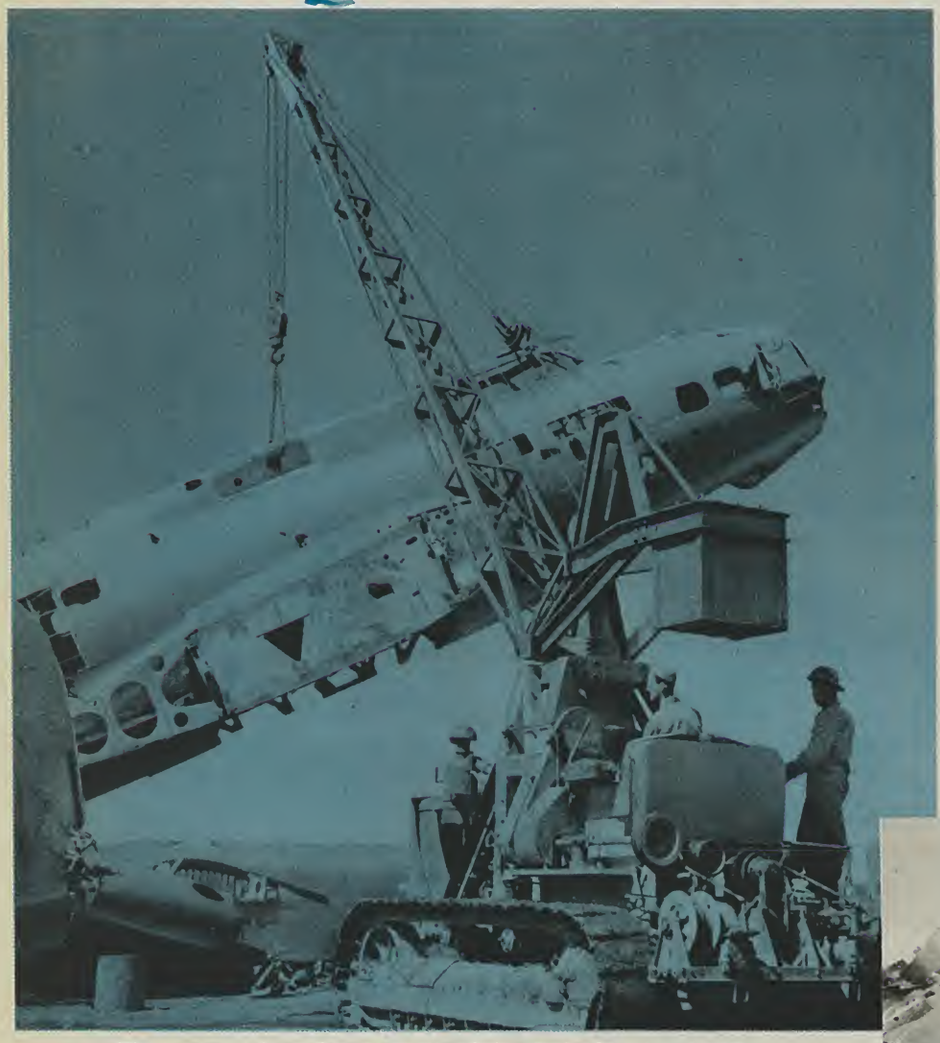
I am as much a fraidy-cat as anyone. Yet in ten months' time I have flown from New York to London, from London to Londonderry, from Ireland to Iceland, from England to Africa and from Morocco to Cairo, and from Cairo to India, besides many side trips, such as Luxor and Palestine, in between.

Never once have I been frightened on any one of these airplane trips.

No hero, I. I am frankly terrified now and then. Do you know what frightens me? I am the boy who is afraid when riding in a jeep.

◀ C-87 passengers traveling trans-ocean.

AFRICAN GRAVEYARD



These great salvage heaps are now being "mined" systematically.

SOMEWHERE in the depths of Africa is a fabulous graveyard for elephants, says an old legend. It is full of ivory tusks that would make the fortune of any man who found it. Thousands have searched, to no avail. The story remains a legend.

But today Africa in the north is full of graveyards that hold wealth even more useful than ivory, in these days of air war. In these yards lie the remnants of the bombers and fighter planes which did their jobs, and then barely managed to make a last flight home. The war has now swept far on beyond the Mediterranean shores. The great salvage heaps near the African airbases remain.

These are now being "mined" systematically and regularly. In one large salvage yard at a Fifteenth Air Force Service Command advanced air depot, more than 600 tons of damaged aircraft are handled every month. From these aircraft, during two months in the summer of 1944, more than 78,000 small parts and 1200 large units were salvaged, refurbished and put into the supply bins for re-use.

Figures on file in the depot aircraft engineering office indicate that each month over 200 damaged aircraft are sent back into service over Nazi strongholds, made whole again with salvaged and new parts.

If a plane is an irreparable wreck, it makes spare parts. When beyond all mortal help, the shattered hulk is unceremoniously parked in the salvage yard. But it will fly again in the Mediterranean theatre, at least in part, by being used on other wrecks that can be rebuilt to fly again.

No matter what the condition of the wreck, it is not left to rust in the unkind Mediterranean climate. Salvage men work throughout the daylight hours, and on night shifts, too, cutting the thousands of rivets and unscrewing the thousands of screws that hold the big machines together.

Instruments, being delicate, are removed first. Then begins the task of removing tail surfaces, wheels, landing gear, oxygen equipment, turrets and other armament, propellers, engines, superchargers, bomb racks, and finally even the sheet aluminum skin itself. All the myriad pulleys and wires are examined with an eye to future use.

When the fuselages and completely ruined wings and tails are left skeletons shining in the sun, they are still a source

Below, wealth even more useful than ivory

of little odd parts — a bolt, a screw, a brace, a scrap of rubber, perhaps a pulley.

Eventually, the stripped ribs and battered and bent metal are loaded into trucks and hauled to quartermaster salvage yards for shipment to the United States for remelting. Some of it doubtless comes back again in new planes. For you just can't keep a good plane down.

NO MEDALS FOR WEATHER RECCO

"Weather reconnaissance goes out first — alone."

By Lieutenant Walter Petravage

TENSE bombardiers peering through the bombsight, daring pilots dodging flak and maneuvering great Liberators against enemy fighters, do not tell the complete story of a successful bombing mission.

There's always the weather reconnaissance that goes out first. Alone. At night. Such missions do not make sensational reading in the newspapers; you won't find them told there. But ask any seasoned bomber pilot about the importance of accurate weather information. And then ask him about the job the weather recco does.

In the States, if you want to know the weather, you pick up your phone, dial a number, listen a minute, and you have it.

But in the war theatres the enemy won't give you this information. True, when you have *area* targets, such as are frequent in the European theatre, you can bomb through clouds with some hope of accuracy. But in the Southwest Pacific, where *pinpoint* targets are the rule, the weather in the immediate area just has to be good.

Since the enemy won't oblige with a report, you go and learn the weather for yourself. Nothing is gained by sending out large formations of bombers with fighter escort, only to find that the target is unavailable. Hundreds of thousands of gallons of high octane gasoline that were tediously transported by boat across thousands of miles of water are wasted. Hundreds of tons of bombs have to be dropped in the ocean with no damage to the enemy, because it isn't safe to land with a death load. And human lives, most precious commodity of all, will be needlessly risked. On one raid four bombers in formation flew into some weather. One came out. One other was spotted a week later, a broken piece of wreckage in the jungle. The other two were never accounted for.

Thanks to "on the spot" radio reporting of weather by a "recco," fruitless and costly missions are considerably cut down in number.

The weather recco plays a role usually as dangerous as it is useful. Take-off is at night — often in weather that keeps other planes on the ground. Flying into unseen thunderstorms and precariously close to high mountains, the plane reaches the enemy target. There it circles until dawn, reporting the weather every half hour, and inviting enemy night fighters to come up and take a crack at it.

With the first light in the East, the plane sends in a final, accurate "over the target" report to the base where the bombers are waiting to take-off. Then the pilot heads home for coffee and sleep. Sometimes, though, there is no coffee and sleep. No coffee, anyway. The "weather recco" just never returns.

One night we were staging out of an advanced field. Next morning we were scheduled for an unusually large raid on a major Jap base. Allied strategy for the ensuing months depended on the success of this mission. It mustn't fail. Much de-

pended on our knowledge of the weather over the target.

At eleven o'clock that night a steady rain was falling and there were thunderstorms all over the area. We were trying to get some sleep without much success. Thoughts of tomorrow's raid and the foul and unpredictable weather didn't make for a peaceful mind.

There was some conversation going on and a few stories were told. I remember how one pilot, O'Brien, was rehashing a dream he had just the night before. In his dream, he was forced down near the target—going down, down, down into a deep river that had no bottom at all.

As he talked, somebody came in from squadron headquarters with a message. O'Brien was to fly a weather recco at three o'clock. Dean, who was my pilot, was to go out earlier at one. Two weather reccos in one night meant that tomorrow's mission was damn important.

Dean was my pilot and so I had a weather recco at one o'clock, too, and that wasn't good. With the present weather, dead reckoning was the only navigation possible because there were no stars and you couldn't do pilotage at night.

It wasn't good.

We had something to eat about midnight and then took a truck out to the plane. It was still raining and we all got uncomfortably wet.

Out at the plane we found the bombs had to be unloaded and that took half an hour. Finally, about one-forty, we were in the air. We circled the field to get altitude and try to find a hole in the clouds. We climbed to five thousand, ten thousand, fifteen thousand feet, searching for a hole that would let us straighten out and get on course to the target.

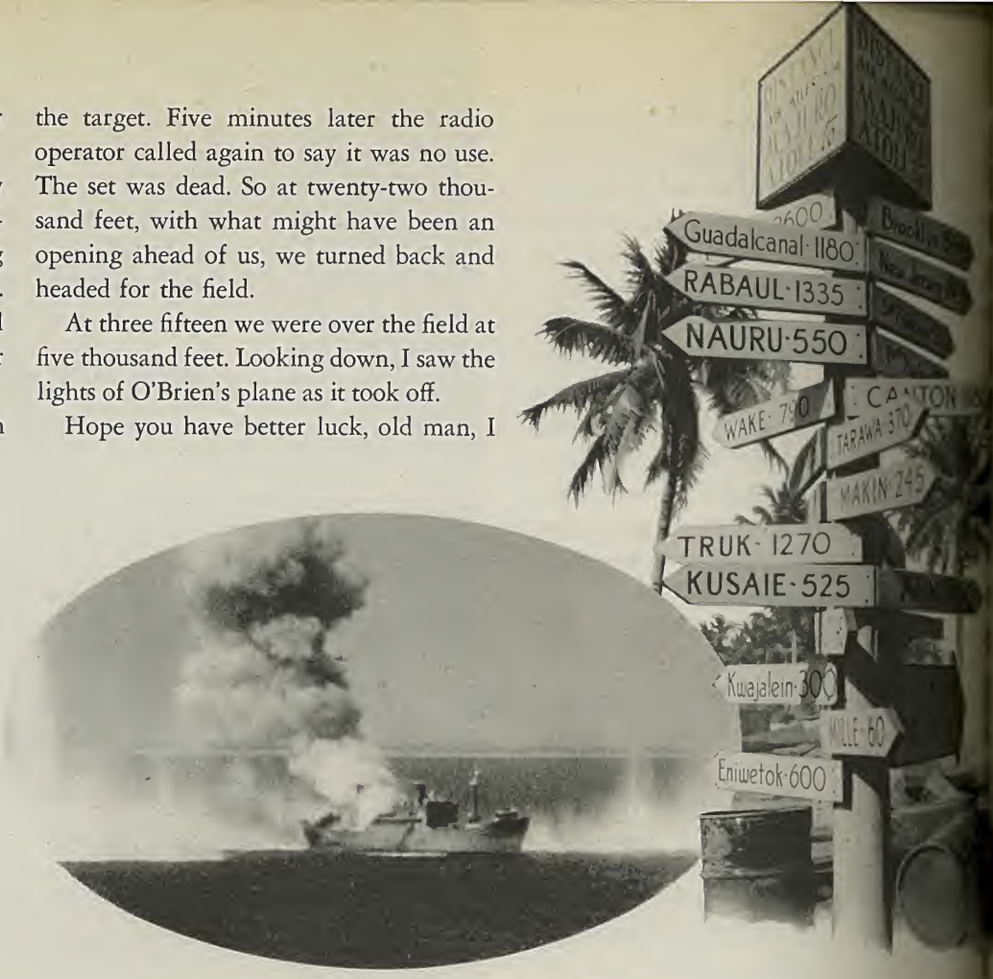
Thunderstorms filled the sky and we tried to pick our way delicately around them. Finally at twenty-two thousand feet we saw what might be an opening and headed for it.

Then the radio operator called the pilot on the interphone. He said he had lost connection with the ground station.

The pilot told him to keep trying. Without radio communication our weather mission would be futile, even if we did get to the target. Five minutes later the radio operator called again to say it was no use. The set was dead. So at twenty-two thousand feet, with what might have been an opening ahead of us, we turned back and headed for the field.

At three fifteen we were over the field at five thousand feet. Looking down, I saw the lights of O'Brien's plane as it took off.

Hope you have better luck, old man, I thought. It's pretty mean weather up here.



Liberator strike on a "pin-point" target — a Jap ship.

We landed and rode back to our tin-roofed shack. We were tired and worn, and secretly a little happy that the radio had failed. That night wasn't made for flying.

Next morning we were up at ten o'clock and found that the mission hadn't taken off. No weather report had ever been received. O'Brien had called in at four-thirty, but after that . . . silence. He should have been over the target by six-thirty. But there had been no report.

I remembered the thunderstorms.

O'Brien never came back. And he never got any medals for that mission. Or one headline, even on a cross.

VERY often navigation is extremely difficult on a weather recco. You're flying at night, so pilotage is impossible, and since the weather is usually bad and the stars invisible, celestial navigation is out. Radio navigation is also impracticable in tropical storms and highly inaccurate. So you navigate by dead reckoning. And sometimes it's pretty haphazard. With the pilot continually turning to avoid ominous clouds and thunderstorms, an accurate estimate of position is impossible.

This uncertain navigation frequently leads to interesting situations.

On one recco the navigator thought they were over the target but he wasn't certain. So he told the pilot to descend to a thousand feet.

For about ten minutes they flew in wide circles at a thousand feet. Suddenly, about two miles to their left, the lights of a runway flashed on and a searchlight beam marked the approach to the Japanese strip.

The navigator's ruse had worked. The Japs thought this Liberator was one of their own planes that was lost, and conveniently turned on their lights.

The navigator, having located the field, told the pilot to climb to eight thousand where they circled until dawn while sending in weather reports.

At times navigational difficulties don't resolve so pleasantly. Gas is vital, and the Pacific Ocean is large. Playing hide and seek with thunderstorms can get you irretrievably lost over thousands of square miles of water, with a small rubber life raft between you and death. A life raft is marvelous if you can get to it. But planes have been known to sink in thirty seconds.

On New Guinea, some of the mountains

go up to 16,000 feet. Flying blindly over terrain like that is nerve wracking. If you're lost and can't gain altitude, you just fly and pray that a mountain doesn't hit you.

Sometimes it does.

You never get details of reccos that run into such difficulties. All you know is that another weather recco didn't return.

There's one recco the fellows are still talking about. It was flown by a pilot in my squadron, a fellow who slept in the same tent with me. He was lucky enough to get back, and so I got the details first hand.

There were the usual thunderstorms over the coast that night. And it was raining, also as usual. The weather officer at the briefing told the crew that if they stayed inland they might escape the storms. Stay

Cross-roads sign set up by Liberator crewmen on Pacific isle.

inland till you come to the Gulf, and when you cross that go up the valley.

Of course the valley was very narrow and there were twelve thousand foot mountains on either side and the ceiling was apt to be low. And yes, they might find icing conditions at thirteen thousand and the valley would be rather hard to find if they had to dodge too many storms.

But there's a mission going out tomorrow and they have to have the weather over the target.

Give it a go. You might get through.

As soon as they took off they hit the edge of a thunderstorm. It tossed the plane from hell to hallelujah and they didn't know for a couple of minutes whether they'd get out of it.

With a lot of praying and some excellent flying they managed to get clear, only to find thunder squalls all around them. It was touch and go for about half an hour, with the plane resembling a swivel-hipped full-back dodging wildly down a crowded football field. The navigator's charts were all over the floor. The radio operator couldn't find the key to send a coherent message. The pilot did a masterful job but aged ten years doing it.

Finally they broke out in the clear and the pilot turned to the navigator for a heading. He realized, of course, the impossibility of accurate navigation in what they had gone through. But he wanted a heading. Something in degrees and prayers that might take them to the valley.

The navigator, who had tried desperately to keep a tabulation of the different headings, did some quick figuring. Then he told the pilot to fly three hundred and forty-five degrees. That should bring them to the entrance of the valley in half an hour.

The pilot, remembering the twelve thousand foot mountains, took the heading and climbed to thirteen thousand. Half an hour later the navigator tapped him on the shoulder. "Okay, we should be at the entrance to the valley. Take a heading of three hundred and twenty degrees. That'll take us up the valley to the target."

THEY turned up the valley flying at thirteen thousand feet. Inside the cockpit the phosphorescent instruments glowed green in the dark. Outside was complete blackness.

After ten minutes the weather began to get worse. The pilot turned to the navigator and suggested crossing the mountains to the right and letting down over the sea. There they might get under the weather.

Again the navigator made some quick calculations. "As I figure it, if we fly ninety degrees to the right for ten minutes that will put us past the mountains and over the sea. But to make sure we'll fly for twenty minutes. Then we'll be certain of being over water."

Ninety degrees to the right and they flew for ten, fifteen, twenty minutes. The pilot turned to the navigator and received a nod. Slowly he began to let down. Still nothing visible around them. But they were over the water now and could get down quite low.

Twelve thousand eight hundred . . . twelve thousand five hundred . . . twelve thousand two hundred . . .

Then it happened. Something blacker than the blackness around them, loomed up in front. They didn't have time to think. They couldn't think.

A mountain!

The pilot pulled back on the wheel until it cut into his stomach. The co-pilot rammed both hands against the throttles and almost forced them through the front of the plane. The heavy bomber angled high in the air like a jittery pursuit. The radio operator and navigator were thrown to the floor.

They thought they felt a slight jar. A sort of hard rending. But they weren't sure and they didn't care much because they were over. The bomber was almost stalling out and the pilot quickly shoved the wheel forward.

They straightened out and the co-pilot tried to adjust the throttles. But he didn't have much success. His arms were too weak. He was trembling all over.

The plane levelled off at thirteen thousand five hundred. The navigator, when he was finally able to talk, was apologetic. He had miscalculated. They had been farther inland than he had reckoned. But they were over the sea now. They could turn up the coast to the target. He gave the pilot a heading.

Arriving at the target they began circling. The weather had improved and from eight thousand feet they could see the dim outlines of the coast and could calculate the approximate position of the Jap airfield.

About fifteen minutes after they arrived at the target the radio operator picked up something. Two objects somewhere on their right. Night fighters? Maybe. Gunners ready, and don't shoot first. Don't give away our position.

An hour and a half of sweating went by like this, until the operator lost contact. Then came a cigarette and a sigh of relief.

Eventually dawn came. The last report was sent in and they were on their way home. The weather was good. Get the bombers into the air!

Four hours later they were drinking coffee in the mess hall and trying to forget about the mountain they nearly took with them. Remember the slight jar they thought they felt? Well, there *was* a dent on the underside of the fuselage near the tail.

But by that time the Japs were catching hell. Our bombers, through accurate weather information, knew they had an open target. The boys on that mission would probably get some medals and the newspapers would certainly carry headlines, "Liberators Bomb Jap Island."

But you won't read about the weather recco. And there won't be any medals awarded for *that* mission, at all.

GREAT BOMBERS TO GUARD THE *Peace*

Before the Air Forces and the Aircraft Manufacturers can determine finally on post-war policy, America's post-war political commitments must be known. The question of what these commitments shall be is now being debated by the statesmen, and was the subject of the October conference at Dumbarton Oaks. This was not open to the public. But accredited reporters and writers did have personal access to the statesmen attending the sessions. Burnet Hershey, who talked to many of them, tells here some important things he learned about developing viewpoints.

Mr. Hershey is author of The Air Future — A Primer of Aeropolitics, which he published after visits in 1943 to American air bases in Britain, Africa, South America, and the Caribbean. In 1944 the Foreign Policy Association published his Skyways of Tomorrow under its imprint. He has spent 27 years as an American correspondent, covered the Paris Peace Conference, and has since covered 22 others, of which the latest were those at Quebec, Hot Springs, and Dumbarton Oaks. He has written a number of books and hundreds of articles on world affairs, and is also known as a radio commentator. Mr. Hershey is now in France on a new assignment for "Liberty."

PLANNERS for tomorrow's peace at Dumbarton Oaks were supposed to concern themselves only with the broad lines of the security structure and not with the "details." But much serious discussion arose, among the thirty-nine statesmen gathered in that stately mansion near Washington, about the mechanics of accomplishing the job.

Behind the scenes, the talk is no longer about pious purpose. The talk is about teeth — sharp teeth for tomorrow's peace agency. Are the teeth seen as global armies and navies? Not at all. The talk always reverts to the use of air power. And this seems to be the one project likely to emerge, after a few months or a year, as the only realistic approach to international law enforcement. While it has been most loudly advocated by Moscow, the Anglo-Saxons seem likeliest to be the providers of the instruments. Those instruments, in the form of the B-32 and the B-29; are already in hand.

Outlines of the general plan for converting the United Nations into a peace organization backed by armed forces have, of course, already been announced. Authority to use these forces would be vested in a United Nations Security Council of eleven voting members. On this council the Big Four — and, "in due course," France — would hold permanent seats.

Complete details of the Council's plan of operation have not been published — and in some instances are still to be decided. But this writer is able, at this stage, to present in broad terms a description of the plan for its use of air power, as obtained from several sources and pieced together with the aid of reliable guides.

The statesmen have called it, in conversation, "The Security Air Force." This Security Air Force, made up of national units, would be subject to orders by the vote of four Great Powers — the United States, Great Britain, Russia, and China. The exact system of voting is still to be determined. The Security Air Force would be authorized to make warning flights over, and, if necessary, air attacks upon, any nation threatening to break the peace.

All that is just blueprint — except as this "open conspiracy in restraint of war" is prepared to welcome as its agent a weapon which is now the most powerful in the armory of the United States and her British ally. Armed with this weapon, the Air Corps of what Russia calls the "International Organization of Safety" becomes a thing of form and substance. It can persuade and compel more eloquently than all the public opinion, moral fervor, and earnest conscience put together.

This weapon is the American superbomber — the forthcoming Dominator (B-32) of Consolidated Vultee, and the B-29, which has just been going into action — together with future Bs, on up. The B-32 and B-29 are — in effect — sister ships; both were designed (one by Consolidated Vultee, one by Boeing) to meet

a single set of requirements laid down by America's Air Forces. What those requirements were has not yet been revealed. We know only the barest details. But it is a certainty that in range, armament, and bomb load, these new bombers are the greatest air-weapons built to date.

Further, the men who are giving so much thought to the problem of organizing peace — men disheartened by the many unrealistic, dream-world plans glutting the files of allied governments — consider them the most practical peace instruments we have yet developed.

"Here is a long-distance policeman," remarks one seasoned statesman, "capable of enforcing a mighty long period of peace and quiet." Another experienced diplomat sees in the super-bomber a means of ending "the dilatory treatment of international problems." Still a third treaty-framer, reading the headlines, says that these planes, while not very "lovely" weapons, are a sure prophylaxis against provocative and belligerent führers wherever they may crop up.

It is generally assumed that any world organization will, basically, be nothing more than a restraining group, created to impose collective authority on a disturber of the peace. The lesson taught by World Wars I and II is that the impact of international peace-keeping must henceforth be more than moral. It must be physical.

This is where America's forthcoming super-bombers fit perfectly. In a sense they will not be "international." But they will *operate* internationally for the general welfare.

There will be a system of regional *national* patrols, used to keep *international* peace. As it now looks, America's area will doubtless include the entire Pacific from the coasts of California down to New Zealand, up to Alaska, and over to China. That's a lot of watery territory, as Messrs. Nimitz, Halsey, Spruance, MacArthur, Vandergrift, and Stilwell know only too well. But it is the area on which the safety of the United States, Canada, and the rest of the Western Hemisphere must depend. And no other nations on earth can patrol it, except the United States and Canada. That is true because these two are the only nations which can afford to do it, and at the same time stand to lose so heavily in life, property, and liberty if it is not done.

It may be a good many months before

Symbol of world holocaust that must not happen again: Mass being said for American mothers, at the graves of their sons in a cemetery in France.
AAF Kodachrome

military secrecy will permit full publication of the entire, almost miraculous, power of destruction which our new superbombers are confidentially known to carry.

But it is at least known that their range is so wide, and bomb-carrying capacity so great, as to put them completely beyond the class of any other aircraft. Already the machines in action are in international use, and are under joint control. They are all assigned to a special Air Force — the Twentieth of the USAAF — which takes its orders directly from the Joint Chiefs of Staff — the United States and British Allied military board, in Washington.

The operating theatre of the Twentieth Air Force is the Globe. It is considered too powerful, and its cruising range too extensive, for any attempt to limit its use to any one theatre. Conservative, experienced airstaff officers are on record as believing that, from a dozen bases strung around the world, these super-bombers could converge on a would-be aggressor and smash his communications, factories, and airfields before mobilization was completed.

Perhaps the most important thing about Air Force 20 is that it can end debate about the future possibilities of an international Security Air Force. In Air Force 20, we have just that, operating right *now*. A joint U.S.-British staff controls the operations. Joint crews, both aground and aloft, service and manipulate the planes. The effect of this not only in shortening the war, but also in preventing another, promises to be hardly less than revolutionary.

Now that's the kind of post-war security most of our boys who are doing today's fighting will understand. To them, the foundations of peace rest on a few rather simple notions. First, there has to be a will to cooperate for peace, among nations of good will. Then, if an enemy begins to stick his neck up out of the mud again, these men want the right to use their hard-won techniques without any hesitation or delay.

Most of the airmen I have talked with don't particularly care about the details. They simply want a few plain rules of international law, with restrictions imposed on the privilege of any nation to move armies, navies, and air-fleets across the border of another nation — under penalty of getting a good kick in the teeth if they try it.

Most fliers of all ranks that I have met feel an air patrol will operate more smoothly if only a few nations act as "Trustees of the Peace." They have more confidence in such an arrangement than in any kind of "police powers" being given to a general League of United Nations.

Possibly their opinions have been influenced by the splendid way in which British and American units have been, and are now, working together on land, sea, and in the air. The smooth operation of the Joint Chiefs of Staff in Washington is another indication of the ability of Americans and British to cooperate for a common cause.

To many it seems obvious that — without any more involved procedure than adding to the number of planes and men and bases — the Anglo-American Air Unit could (and perhaps may) be the "First Air Police." Under certain conditions, this group probably could even do the job all by itself.

Naturally, the two partners would have to have the genuine and wholehearted moral support of the majority of other nations of good will. Possibly, later on, other nations might be asked or might request — and be welcomed — to help share the responsibility.

But for the moment, apparently, the plan is to try it out on an "English-speaking basis." There seem a good many sound reasons why this should be so. For one thing, in the formative beginning, it avoids language difficulties and misunderstandings, which could be fatal to its development at this stage. Also, between the territories of the British Commonwealth, and the Islands that the United States is taking from Japan, plus United States possessions, Air Force 20 will shortly have all the strategic bases it needs for its primary purposes — except those which are still to be established in China for use against Japan.

ONE tremendous value of our new superbombers exists in their great range. This range permits the planes to fly straight from fields located near large sources of fuel and supplies. To a degree that is still almost unbelievable, it should make our defense system independent of slow-moving surface supply routes. And the complications once expected to arise from maintaining numerous bases on begged, borrowed and leased territory, may largely be avoided.

Exultant American airmen, just [illegible]

Naturally, enemy lands will be occupied by our ground troops as we move on to the final seizure of the enemy capitals, and destroy enemy governments. But our occupation can be ended much more quickly, and with much less friction for future relations between ourselves and the enemy civilian populations, if our ground occupation concerns itself chiefly with the restoration of order. Thereafter, emergency air patrols should reduce the necessity for keeping large garrisons in the conquered countries. For sufficient paratroopers could be flown to pacify any given area in almost as short a time as would be needed to deploy mechanized ground forces from a central barracks.

Of course, Allied occupation forces will have to keep local Inspectors in practically all the large enemy metal and chemical plants, changing inspectors often to avoid any accusation — as well as any reality — of collusion. But these inspectors will be greatly aided by knowing that if they are given any reason to suspect any trickery, a military force will take over the community within a matter of two or three hours and an impartial military inquiry will result immediately.

There is some talk of forbidding the vanquished to have factories for the manufacture of any products useful for war mak-

AAF Photo

Bulgarian prison camps, come home to base.

ing. Perhaps this is not to be taken too seriously — the experts still disagree. But even a measure like this would require strict patrol and frequent police inspections.

It's the short, straight, honest way to keep the world at peace — once we get it there. It is simple, economical, and avoids the necessity for great standing armies. In fact, large armies would simply get in the way, while piling up enormous and unnecessary expenses for taxpayers.

Air Precinct Stations, with patrol "beats," would operate exactly like the familiar police precinct stations from which bluecoats start on their daily rounds in every American city. Nor would there be much difference in the systems. Each Air Precinct would have patrol, or squad planes, and radio, radar, and other detecting devices to control air traffic in its area.

Every private, commercial, or official plane entering the area would have to signal its approach, give its international license number, its speed, size, destination, and the height at which it was traveling. In case of any question about an approaching plane, fast patrol aircraft would zoom to investigate and report.

Suppose a police party arrives at an island, unvisited for some time, to find forbidden manufacture of aircraft, explosives, gas, or other forbidden items, being carried on. Suppose, as is likely under such conditions, that the party is murdered as soon as its plane lands. Even if no alarm were given, the failure of the inspecting party to report on schedule would, of itself, be an automatic alarm.

Immediately a squadron of super-bombers would converge on the point from the various patrol stations; a radio demand for surrender would be sent to the workers and inhabitants, ordering them to assemble in large, open spaces at once on pain of being bombed without further notice; and the bombers would watch this assembling from above. Then paratroopers would be dropped to encircle the area. If the inhabitants assembled peacefully and submitted to search by the paratroopers, the guilty parties could be segregated, and taken away for trial. If not, pattern bombing would end the incident.

In some parts of the world use of the super-bombers would not be required. Smaller planes would be more efficient as local patrols. But the plan in general is regarded by practical airmen as obvious common sense.

Traffic control would be only one duty of these air precincts; just as the Traffic Squad is only a part of any municipal police force. The main duty of all city or state police is: To Keep the Peace. And that would be the main purpose of the Air Police. To supplement the "Riot Air Squads" with their Superfortresses, local air units would make regular tours of their districts to observe any unusual activities, either on the ground or in the air, sending reports by radio which could be picked up all over a wide area.

The exact number and location of Precinct Airguard Stations may be subject to change and revision from time to time as new territories are developed. Some have suggested that for years to come a round-number total of about 500, scattered across the globe, may be accepted as the maximum needed.

In the beginning, as many of these as possible will probably be located on islands, for a number of fairly obvious reasons.

Islands are always — in a sense — independent, rather than an integral part of, the economic, political and social life of any nation. Second, islands permit close cooperation between the Airguard and any surface operations that may have to be undertaken by naval units. Third, islands are natural vantage points with vistas of unobstructed sky and sea for observing and detecting air movements.

None of the island installations need disturb the national ownership of the islands themselves. And the economic benefits of permanent air fields with constant change of personnel should be popular with the islanders.

The immense area of the Pacific may require many more small Airguard ports than does the Atlantic. Luckily the islands are available. Many of the necessary bases are indeed already in existence — though censorship now veils their location, and much of the patrol work conducted from them.

None of the peacetime Guardports or "Precincts" can be maintained, and none of the Airguard planes and crews could function in peacetime, unless a Code of International Law is accepted as the fundamental obligation of the majority of nations.

There is no ethical or other necessity that acceptance of such a code be unanimous. The Police Forces of great cities find, and arrest daily, numerous individuals who do not accept the codes of State and Municipal laws governing conduct in civilized communities. Those individuals are "outlaws," or "criminals," because they insist on having their own way to the detriment and damage of other individuals. Morally, there is no valid distinction between such criminal psychology on the part of an individual, and that on the part of a nation. Individuals who refuse to be cured are often executed. They don't necessarily approve. But the system keeps the rest of us at peace, and in comparative security. So, ran the talk at Dumbarton, can the system of Air Police.

One big question remains. The system outlined seems quite adequate to assure that Germany and Japan will never again menace the world. But what if one of the big Powers, holding a permanent seat on the Council, itself tries to run amok?

Russia wants a unanimous vote of the Powers before the international forces would be called into action. Britain and the United States see difficulties in any such requirement. On this point, a good part of the future debate over the project will doubtless be focused.

TRAINING THE FOREIGN LEGION

Boys come to us from all over the world to learn American techniques of flying in Valiant Basic trainers.

Chinese cadets are trained at Luke Field, in Arizona.

IN the days when Rome emerged from the status of a provincial nation to become a world power, foreigners in countless numbers joined the Roman armies, and were given the Roman training, to prepare them as useful soldiers in enforcing the Pax Romana.

Modern America is somewhat similarly training the sons of many foreign nations in its air forces — but with a difference. When their training is finished, it is not expected that they will serve under the American flag. Instead, it is the usual understanding that they will return to their homeland, to provide the nucleus of a strong airforce under the flag of their own nation.

And so, at our various ports of embarkation, you will meet Dutch boys and Brazilians, Chinese lads and Javanese, French youths and youngsters from Turkey, all graduate pilots bound outward from these shores to carry their American training to other parts of the world.

These foreign boys who win their pilots' wings receive their American tutelage in accordance with certain provisions of the Lend-Lease Act.

Oldest of our "international" training courses is the one given at the Army Air Field in Marana, Arizona, where students from China receive their basic flight instruction. More than half of each class is composed of cadets who resigned their commissions in other branches of China's armed forces in order to become eligible for pilot training. Graduates of China's West Point — the National Military Academy — they formerly were officers in the artillery, engineers, cavalry, infantry, or signal corps.

Arriving at Marana with a Training Command background of 65 flying hours in light primary planes, the Chinese soon get on intimate terms with the heavier and faster BT-13. During their 70 hours in basic training, they become acquainted with instrument flying, with two-way radio, use of flaps, variable propeller pitch, fuel mixture, precision pattern flying and aerobatics.

Their studies closely parallel those of their American classmates, with the addition of a daily class in the English language. Although most of them have received preliminary instruction in English before coming to the United States, few of them arrive with sufficient command of our language to converse in the technical terms peculiar to the flying fraternity. Hence interpreters are used in ground school lectures, and English instruction is continued throughout their training course.

The language problem also is met by assigning them several Chinese graduates as pilot-instructors. After completing basic in the BT-13 and moving on to advanced

Dutch and Javanese train at Jackson, Mississippi.

AAF Photos

training where they win their wings, these men take the basic course at Randolph Field's Central Instructors' School, and then return to Marana for duty.

Second to the Chinese affection for the "BT" comes the Chinese liking for athletics. The boys become expert at soccer, distance running, basketball, volleyball — and also at billiards.

During their off-hours they are avid motion picture enthusiasts and soft-drink imbibers. On weekends, they frequently are entertained by Chinese families in nearby Tucson.

AT Gunter Army Air Field in Alabama, where another Training Command basic school for pilots is located, are conducted classes for French aviation cadets who report in new groups every nine weeks. Here, the language barrier is surmounted by conducting classes in English, and also by using French-speaking instructors and maintenance crews. Administrative routine is directed by officers of the French air force, while the actual flying and ground school training is supervised by officer personnel of the AAF Training Command.

A unique but effective innovation has been the printing of cockpit check lists and important Technical Orders in French.

Doing her part in the grooming of French foreign nationals in Alabama is "Grandma," Gunter Field's venerable but sprightly BT-13 that now is flying on her eighth engine. With a total of 3,916 flying hours logged to her credit, "Grandma" has covered some 509,112 miles in the training of pilots, figuring her log at her normal cruising speed of 130 miles per hour. This Valiant craft has had one major overhaul, while new props and landing gear have been added to replace victims of rough student landings. But she still is ranked among the sturdiest of Gunter's many BT-13s that are in daily use by both French and American cadets.

To use as identification in event of forced landings or other flight-eventualities, French students recently were given individual letters stating — in good, plain English — that the bearers aren't enemy aliens. This emergency letter-writing resulted from the predicament of one cadet who made a forced landing in a south Alabama pasture. On alighting from his ship, he found himself surrounded by a group of suspicious Negro farm workers who could understand not a word of the harassed Frenchman's explanation. Brandishing cotton hoes, hay forks and an assortment of similar instruments of destruction, the Negroes concluded that here was a dangerous foreign agent. They kept him at bay until the local sheriff arrived and identified the captive as a well-meaning ally.

BRAZILIAN cadets are popular and progressive students at the Training Command basic flying school at Waco, Texas. For the most part, language difficulties are fewer with them than with other foreign groups in training in the United States, for a majority have a working knowledge of English. Enthusiastic and personable in training, they also are much in demand on weekends, when the Waco citizenry takes delight in playing host to them at dances, parties and dinners.

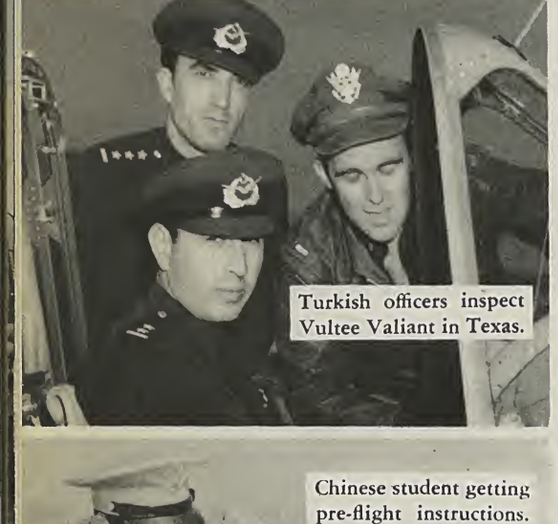
Turning Waco Army Air Field into a veritable league of Nations, Turkish student officers also are on hand to fly the BT-13 with fellow students from Brazil and the United States.

Some of these sons of foreign nations come to us as accomplished airmen who merely want to learn the American techniques. At Waco, for instance, two of the Turkish boys — Rauf Ersoy and Capt. Ferit Goksel — were old-hands in military flying long before they came to the United States for their postgraduate course. As

Brazilian cadets in Vultee trainer.

Chinese engineer studying the Consolidated Vultee procedure.

French cadets study the Vultee Valiant.



Turkish officers inspect Vultee Valiant in Texas.

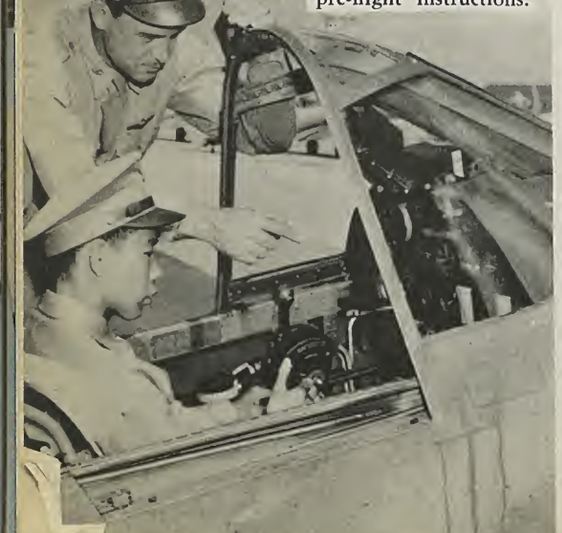
reconnaissance pilots in the air force of their homeland, they skipped primary training in this country and moved directly into Waco's basic school to study navigation, instruments, night flying and radio range technique in the Vultee Valiant. Most of their flight time previously had been logged in British tactical and training ships.

At the Training Command Central Instructors' School at Randolph Field is another Turk, 1st Lt. Muzaffer Sanal, who is learning the AAF's method of flight instruction in the Valiant basic trainer. On graduation he will be sent to a Training Command basic school by the Turkish Government, to serve there as an instructor for Turkish aviation cadets. A native of Istanbul, Lt. Sanal is a graduate of the War School in Ankara and also received two years of training in Ankara's aviation school. His introduction to USAAF flying was at Moore Field, Texas, where he graduated from advanced single engine school and then went to Sarasota Army Air Base in Florida for training in combat flying.

IN addition to training foreign flyers, the United States is also training foreign technicians and engineers.

One of the war's most unusual training programs is currently being conducted by Consolidated Vultee Aircraft Corporation in collaboration with the government of China. It involves 21 young Chinese engineers, who are learning how to build Liberator bombers in the company's plants at San Diego, California.

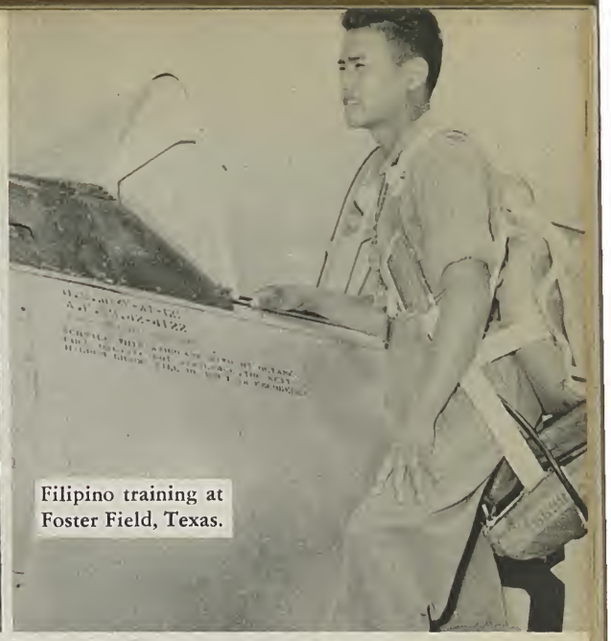
All but one of the trainees are commissioned officers in the Chinese Air



Chinese student getting pre-flight instructions.

Brazilian cadets in primary at Randolph Field, in Texas.

Chinese cadets attend their gunnery class at Luke Field.



Filipino training at Foster Field, Texas.

Force. Most of them could not speak the American language when they left their homes in China a little more than a year ago. They are learning by actually doing the jobs they want to master. They say their greatest problem thus far is that of eating American food without suffering from indigestion.

The program was started through the offices of Lieutenant Colonel S. C. Wang, a member of The Commission on Aeronautical Affairs of the Republic of China in Washington, D. C.

Oldest of the group is C. T. Huang, who was born in Kiangsu Province of China 30 years ago. Huang has a mother and sister in Jap-occupied China. He hasn't heard from them since he left college to join the Chinese Air Force in 1937. Before coming to America, he helped build the plywood airplanes which have thus far comprised the greatest portion of China's air strength. He is the survivor of innumerable air raids, and he has a marked contempt for the Japanese ability to bomb.

Each man specializes in some particular field of aircraft work. For example, C. P. Li, the son of a Chinese general, concentrates on test engineering. P. Y. Hsu is learning manufacturing research. P. S. Chang is absorbing advanced aerodynamics. Several of the trainees are taking special courses in San Diego night schools, in addition to the work load they carry at Consolidated Vultee.

The military members of the group hold commissions as lieutenants and captains, but they all wear American street clothes, and go to work or school looking like ordinary civilians.

Yugoslavian combat unit at Bolling Field, Washington.

Chinese at Marana, Arizona, against background of BT-13's.

In this graduating group are boys from Bolivia, Brazil, Chile, Honduras, Mexico, Nicaragua, Paraguay, Peru.

French boys in Alabama.

FIRE FIGHTING

By Lieut. Windsor Watson, Jr.

Photographs by
Staff Sergeant Ray Sheiber

A PILOT calls the CAA tower at the Air Transport Command Base in Miami: "Keep an eye on me. Can't get my wheels down and there's a leak in the left wing tank."

The tower operator picks up his field phone, then starts in motion the emergency landing system that will envelop the troubled plane in planned precaution.

While the four-engined transport circles above the field with its valuable cargo of men, the CAA man alerts four emergency posts and tells them a plane is upstairs that will land in trouble.

At three crash stations the sirens scream and lights flare on. Trained teams of middle-aged firefighters stamp into boots and trousers. Without command, they rush to polished crash trucks. In 30 seconds six crash wagons are at ready stations along

At right, a crash-landed plane in flames.

the darkened miles of long black runway.

At the Air Base Operations tower near the main field apron, Capt. John J. Brennan switches on his two-way radio to the control frequency and takes charge of the circling plane. He will try to "talk it down."

"Operations tower to 2274," he calls. "What's the trouble with your ship?"

"Can't get the damn landing gear down and I'm afraid to land on my belly 'cause there's gas leaking from the wing tank," the pilot replies, as he circles his plane in the dark above the field. "What the hell am I gonna do? I'm loaded and I've got passengers."

"Hold on, Captain," Brennan says.

He pulls a Technical Order from the shelf beside him, opens it to the chapter on hydraulic landing gear operations. "Operations tower to 2274," he says into the mike. "Captain, have you tried the hand crank to get the wheels down?"

"Yes, but they don't lock."

"I'm going to read from this Tech Order on emergency methods of lowering the landing gear on your plane," Brennan explained. "You follow directions as I read them off and keep circling. Turn off your electrical connections to prevent a spark. I think we can get those wheels down from the instructions in this Tech Order."

As the plane circled, the Captain read; and by short wave radio, CAA tower kept the crash wagons posted on the progress of the struggle upstairs.

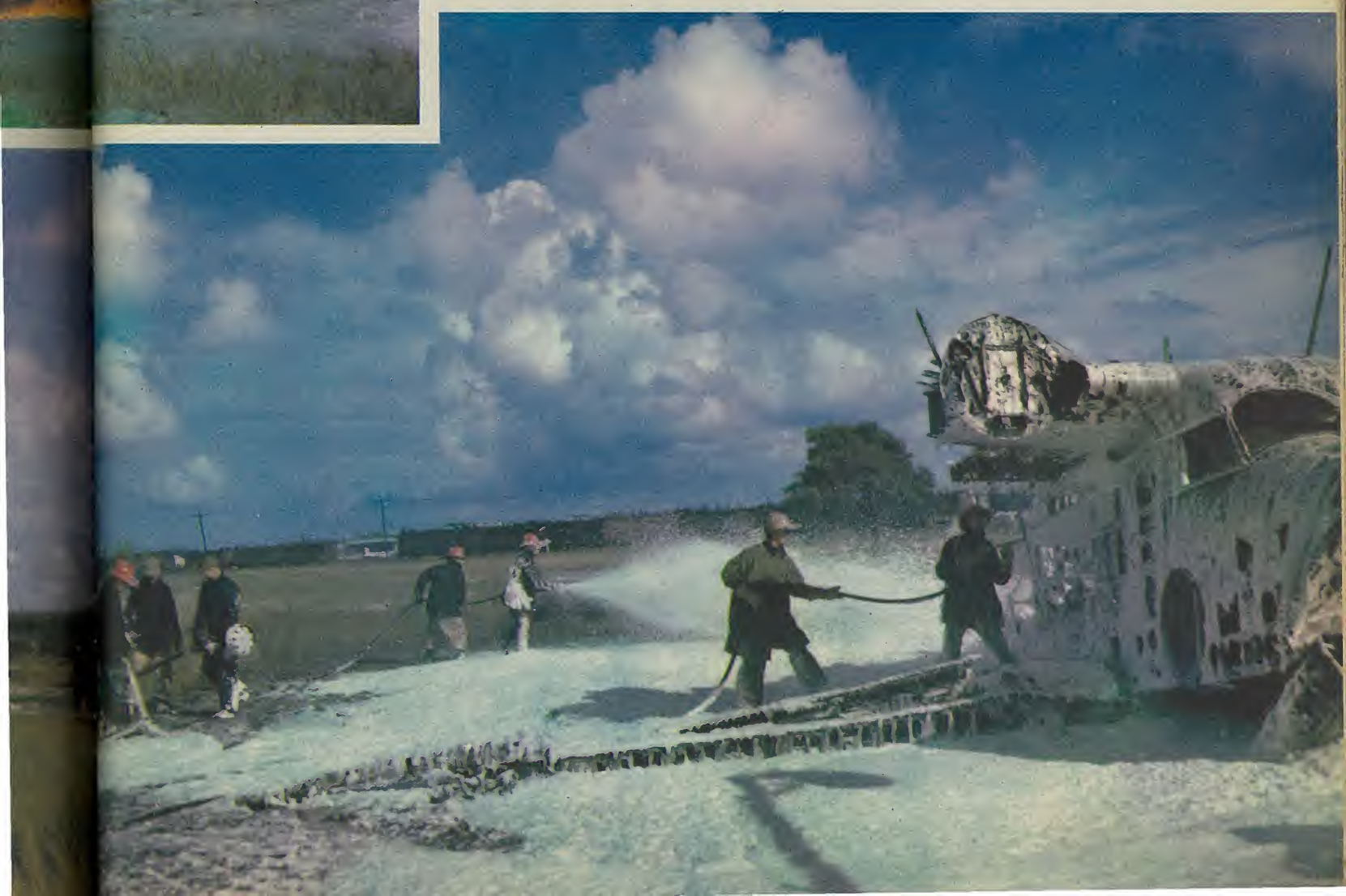
Finally the sweating pilot heard the warning klaxon drone into silence, saw the caution lights on his instrument panel go out.

"They're down," he squawked nervously into his mike, and Capt. Brennan closed the Tech Order. CAA tower alerted the crash crews.

"He's coming in on the northwest-southeast runway. Gas leaking from left wing tank. Crew of four in regular positions; twelve passengers near the fuselage door; non-explosive cargo. His wheels may not hold."

"They'd better," commented Chief H. R.

Below, a Cardox truck has rushed to the scene with three tons of carbon dioxide. The fire is out.



"Smokey Joe" Shaw to his taut fire crew.

THE big plane eased out of darkness, flattened over the runway, greased in for a long run. As it passed, each truck fell in behind to chase it.

Every aircraft-fireman was alert to wind directions, position of the plane, location of the passengers, type of plane, area of possible fire, and approaches to the ship for each piece of specialized equipment.

When the big plane stopped, one fireman grabbed the fuselage door, opened it, told the passengers they could get out now. They jumped one by one to the runway. Two firemen steadied and reassured them.

Firemen on the foam nozzles spotted a widening pool of gasoline under the ship, covered it with a white layer of foot-thick foam so that a spark could not flash the plane into an inferno of fire. Before another fireman — once a jockey — had disconnected the battery and removed it from the transport, the ship was resting on a broad, white-whipped-cream cloud made by the foam nozzles.

Suddenly an uncovered patch of gasoline flashed into fire. Watchers shouted. A fireman poofed it out with a shot of carbon dioxide from his hand nozzle.

The plane was grounded, switches turned off; it was towed from the runway. There gas and pyrotechnics were removed.

Passengers, crew, plane, cargo were safe, and a system developed at the Airplane Crash Fire Fighting school in Jacksonville, Fla., since war started, had once more saved lives and thousands of dollars in a routine operation.

At the Miami field the fire-fighting system is set up like this:

A department of some 70 men works in two shifts. Most of them are older men — they come from former professions as various as the ministry and horseracing. Each shift posts two "jump companies" on the runway to watch every plane that lands and leaves. A field telephone connects each company with the Civil Aeronautics Association Control tower, so that emergency warnings may be sent instantaneously to the spot. There are 10 field phone standby's in the landing area. The "jump companies" handle high-pressure crash wagons with nozzles to blow foggy-blankets of water at high pressure into actual or potential fire areas. With these high-pressure hoses, they

Gas spills can be dangerous. A truckful of carbon dioxide stands by, ready for any emergency.

control fires and get crews out of planes before the main equipment arrives. Their job is to save lives.

Backing up the "jump companies" are a 50,000-pound Cardox truck, two more high-pressure wagons, and three "pumpers." On each alert these trucks take stations beside the runways; they are connected by short-wave radio.

"Pumpers" are regular fire trucks that can suck water from one of the many underground "hydrants" placed every 1,000 feet along each runway. Their job is to feed water to high-pressure units if the fire should last more than a few minutes

The big Cardox unit is the department's pride. It carries three tons of carbon dioxide at zero degrees temperature in its bulging belly, at 300 pounds pressure. It has a long boom nozzle on its top and a short one on the front bumper. Two hand-lines can be reeled from its side.

The Cardox has extinguished in 10 seconds a blazing pit of gasoline 20 feet in diameter. With help of a small high-pressure company, it has snuffed out a fire fed by 1,000 gallons of contaminated gas and oil in one and one-half minutes. No actual aircraft fire could build a bigger blaze than that.

The "Big Boy" also is equipped with "bayonets," long hollow spears with holes in the tapered point. A trained fireman uses the "bayonet" to extinguish fires inside a fuselage or nacelle or wing. He plunges it into the thin aircraft skin and carbon dioxide immediately blankets the inaccessible blaze.

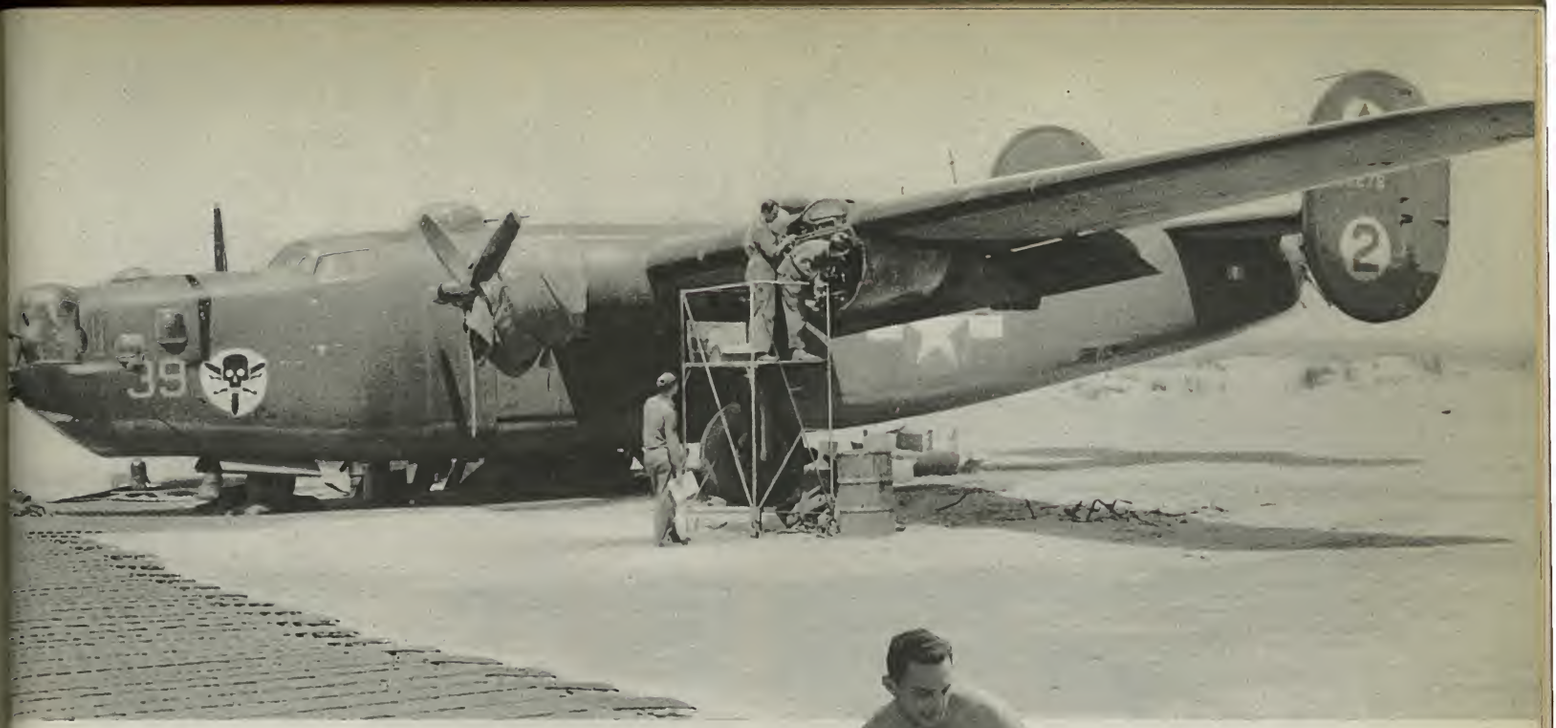
The carbon dioxide that Cardox belches is cold — 110 degrees below zero Fahrenheit. Behind a cloud of its own making, the Cardox can close to within a few feet of the hottest blaze and knock it down.

After the CO_2 truck knocks down a fire, and water nozzles cool the hot metal surfaces, practiced men follow the cleared path and cut into the plane to bring out anyone inside. Only after crew and passengers have been made safe do the Cardox, water, and foam teams attack the fire to extinguish it completely.

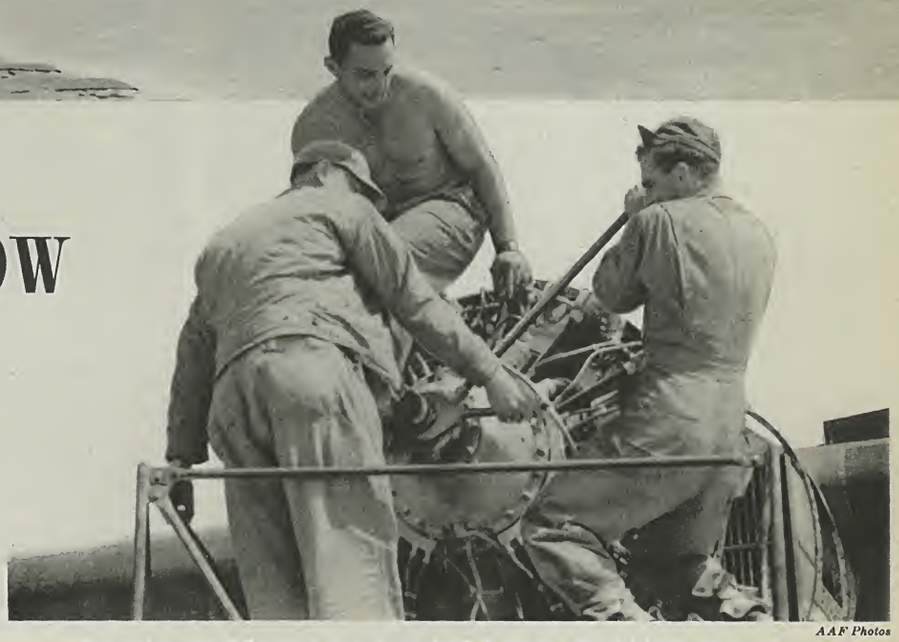
That's the pattern of preparation rooted in long hours of practice with hot fires and months of study on all types of planes parked on the line.

It is seldom put to practice because Chief Shaw, Capt. Brennan of the Air Base Flight Control office, and their men are intent on preventative methods. The operations tower's "talk down" method is a proved saver of lives and planes. Constant alerts for the slightest aircraft difficulties have stopped little fires from which big ones might otherwise have grown.

The big grass landing area for belly-landings has never been used. In more than two years, only one man has lost his life in aircraft accidents, and that was before the present system had been instituted. The Army Transport Command Base at Miami has a high average of landings and departures each month. And almost every plane that uses the air base is loaded with high-priority cargo or passengers headed for China, India, Africa, or England, or returning from one of those battle zones. A spirited professional fire department is insurance for millions of airborne dollars.



"NOT A SPARROW FALLS"



AAF Photos

Repairing the Liberator that crash-landed along the Adriatic shore.

No matter where an Army plane comes into trouble and crashes to the ground, the long arm of the Service Command of one of our air forces tries to reach out and find it, and then do what is required.

Take one instance — a Liberator of the 15th Air Force, which completed its mission over a target in northern Italy. It banked for the flight home, and the crew was beginning to think, "Well, we're getting out of this all right," when an explosion made the big plane shudder. Flak banged against the metal skin. Two engines quit. The outlook had abruptly changed.

The pilot and engineer nursed the plane. It was flying, but that was about all. It was gradually losing altitude. Nobody knew whether one of the remaining engines was going to die. The other B-24s in the group were now out of sight. It was an unenviable spot.

The crew drifted down the Adriatic coast toward their home base. The plane never made it. Lower and lower sank the crippled craft. She reached the front lines of the Eighth Army and the pilot crash-landed her in the sand along the sea, within range of enemy gunfire.

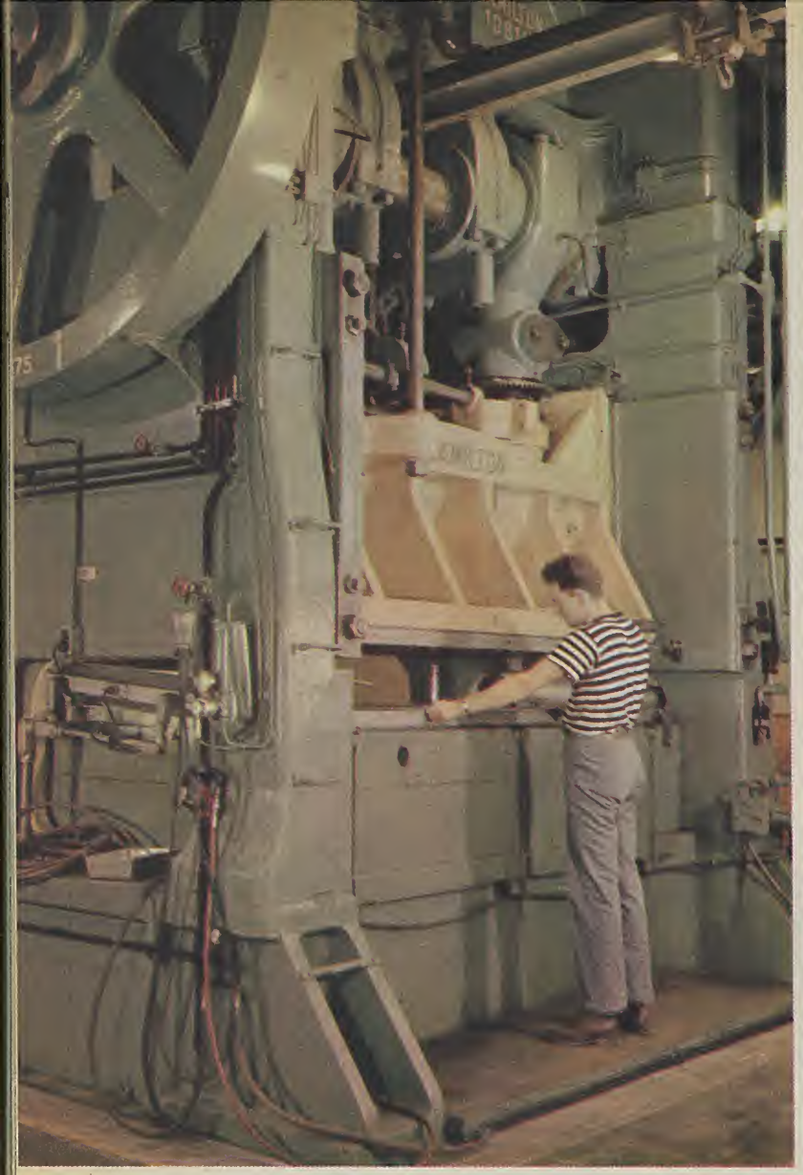
Nobody was hurt. Heading out along the lonely beach, the men made their way to a forward British fighter strip, from which they phoned their base. Immediately a mobile repair unit of the Fifteenth Air Force Air Service Command was notified and rushed to the scene, with Capt. M. R. Bruning, of Indianapolis, and Master Sergeant M. F. Hunt, of Evansville, Ind., in charge.

The crew of eleven looked over the fallen warrior. She was in bad shape. Two engines and two superchargers had to be removed and replaced; new propellers were needed; the undercarriage, crushed during the landing, had to be restored; most important, a taxiway was required, to get the plane out of the sand and up to the British base, from which a take-off could be made.

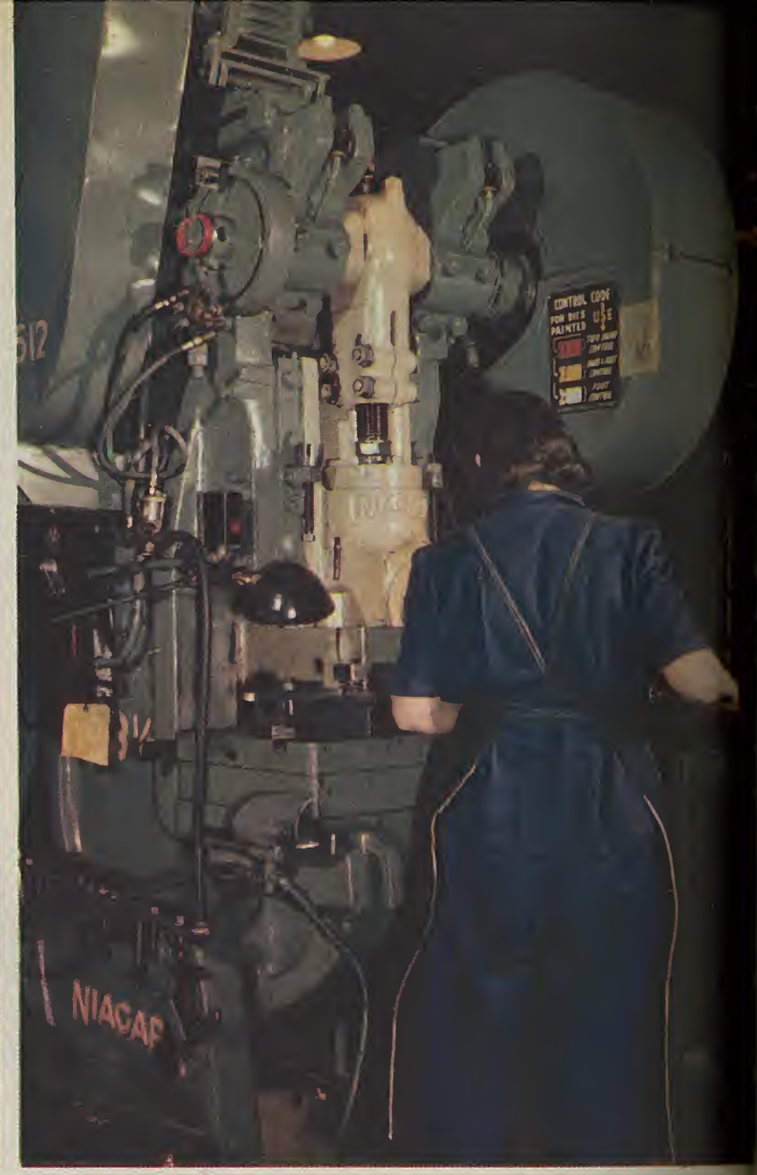
While a few skeptics shook their heads, the men went to work. It was hot. The wind scooped up sand from the dunes and tried to funnel it into the delicate machinery. Supplies had to be hauled hundreds of miles over the poorest roads. Sleeping accommodations for the crew were primitive. Enemy artillery and dive bombers were a constant threat.

But the repairs were made, while Italian laborers from a nearby village constructed the taxiway to the British field some distance off. In twelve days, the plane was ready and flew to its base.

The incident is typical. All over the world Air Service Command crews, operating under conditions like these, are saving downed aircraft and putting them in shape so that they will be able to fly another day. The job of supply and maintenance is not very romantic or glamorous, but it's as necessary as food itself, and it literally keeps 'em flying.



This Hamilton hydropress was formerly a dirty gray.



This Niagara punch press was formerly painted black.

PAINTING SPEEDS PRODUCTION

Photographs by Edward Sievers

WHEN America's citizen-soldiers return to their peacetime jobs, they are going to find that a lot of changes have resulted from the prolonged presence of women in industry; and not the least of these will be a redecorating job that was recently completed in the huge Consolidated Vultee Aircraft Corporation plants at San Diego, California.

Once-gray factory walls now have the clean color of cream. Huge, black drop-hammers and hydropresses have been "done over" to make pleasing vistas of green. And, as a finishing touch, key items such as light switches and crane pulleys have been painted a bright red.

To the male observer who viewed this just as a yielding to woman's whims, it might seem that matriarchy has gone a step too far. But according to J. M. Druliner, chief Industrial Engineer, the new color scheme has a reason, supported by much more than feminine preference. There is sound scientific evidence in hand to show that it is a very tangible aid in production.

"The morale and efficiency of industrial workers are drastically affected by the physical conditions under which they work," says Druliner. "For instance, continued eyestrain leads to nervous tension, causing unnecessary fatigue. Similarly, drab, cheerless surroundings encourage mental depression and make each job seem harder.

"Our new color scheme is designed to eliminate such negative factors. It reduces the likelihood of eyestrain and related physical ailments, thus promoting efficiency and morale. All this is particularly important to women, because of good housekeeping habits. But our men workers are benefiting, too, even though many of them may not consciously realize it. Since the San Diego plants have been redecorated, our records have shown a marked increase in production efficiency along with definite decrease in accidents and absenteeism."

In recent years, American industrialists

have spent millions of dollars on time-and-motion studies in an effort to improve operating efficiency by minimizing the body fatigue of shop workers — and invariably the effort has paid off. Yet, except for improved illumination, little was done to prevent eye fatigue prior to the beginning of World War II.

Then the new science of color dynamics began to receive widespread study. It seemed hard to believe that the color of a machine could have a vital influence on a worker's morale or the rate of production. But Consolidated Vultee executives recalled that a few years previously it had been hard to believe that the size and shape of a fixture would make much difference in the quality of aircraft being produced.

Druliner explains some practical aspects of color dynamics as follows:

"Eye muscles get tired, just like all other muscles. Yet, curiously enough, this tiredness is not commonly felt in the eye itself. Eye fatigue communicates itself to other parts of the body, so that a worker suffering from eye fatigue may feel tired 'all over.' He may consequently become the victim of headaches, digestive upsets, and many other disturbances. Then both the quality and quantity of his work declines.

"Go from a sunlit street into a darkened room, and for a minute or so you will be too blind to see anything. Similarly a worker who glances up from a light-colored machine to a dark wall (or vice versa) will be temporarily blinded. Yet steady fixation upon a given task is fatiguing. Eyes are more comfortable when their direction of gaze is frequently changed. Therefore, it is both natural and restful for men or women to glance up from their work occasionally. If the surroundings are dark, the effect of such glances will be to require readjustments of the eyes for different light intensities. Needless to say, the time this takes produces a loss in individual efficiency.

"In accord with the principles of color dynamics, our important machine sections are painted in different, but not too widely contrasting, colors; and these guide the workers' eyes to specific points requiring attention. Our walls are painted in 'eye-rest' colors, which do not force the employee to make fatiguing readjustments each time he glances up from his work."

SEE INSIDE FRONT COVER

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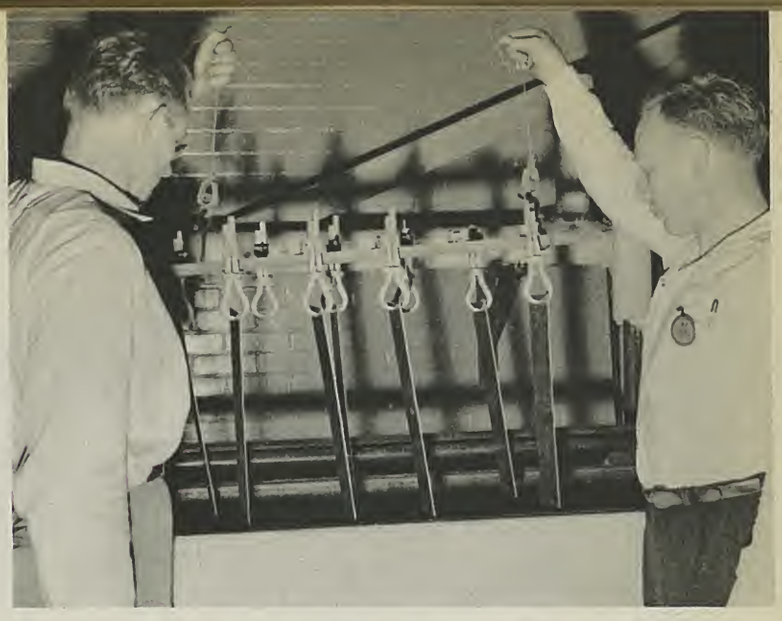

Pickled Magnesium

AIRCRAFT leaders, in unrelenting search for materials which will reduce the weight of planes without jeopardizing the strength of the craft, naturally have turned their attention to magnesium. A recent discovery, which will make the metal far more useful to us in the future, illustrates the kind of extensive research work being conducted by Consolidated Vultee.

Although magnesium was isolated from its ore as early as 1808, by Sir Humphrey Davy, its use as a structural alloy was not given serious consideration until today's demand for superior aircraft became so vital. Magnesium's unique lightness, combined with its excellent strength-weight ratio, makes it the most attractive source of structural alloys to increase the pay load and efficiency of airplanes.

On the other hand, the fact that magnesium is not as hard as other alloys, and is somewhat more susceptible to atmospheric corrosion, has had a tendency to delay its widespread use.

With the hope of developing a surface finish for magnesium alloys that will offer adequate protection from corrosion and abrasion to safeguard the use of the light metal in airplane construction, Consolidated Vultee Aircraft Corporation authorized N. H. Simpson and Paul R. Cutter, chief chemist and research chemist, respectively, for the company's Fort Worth division, to tackle the problem.

Magnesium differs from the other alloys in that paint does not necessarily inhibit its corrosion. Hence it must be processed by some effective chemical or electro-chemical surface treatment. In seeking to discover such a treatment, Simpson and Cutter followed the theory that the metal must be "pickled," or electro-chemically treated.

The two chemists found that such standard chemical treatments as chrome pickle and acid dichromate provided finishes that gave fair corrosion protection. However, such finishes offered no resistance to abrasion and mechanical injury of the base metal. Further, such finishes required four coats of paint to insure proper insulation.

Since magnesium cannot be plated successfully with another metal, the chemists decided to concentrate their research efforts on developing some type of anodizing process.

Since the natural atmospheric corrosion products of magnesium are carbonates, hydroxides, and oxides which are known to be protective, it seemed evident to Simpson and Cutter that better results could be obtained in alkaline solutions.

Temperatures of 32° to 212° F. were tried, until it was discovered that those between 171° and 179° gave the best results. Various voltages and current densities with AC and DC and super-imposed AC and DC were used, but the AC anodized plates maintained the most resistance to corrosion.

Subsequent tests revealed additional successes, until Simpson and Cutter were ready to put their discovery "through the mill". Plates anodized in the Simpson-Cutter process—known as the CVAC No. 1 AC and the CVAC No. 1 DC—were given every known abrasion and corrosion resistant test. When the chemists were sure that their discovery was the real thing, they announced their findings.

Immediately after the discovery of the new magnesium finish process, Consolidated Vultee, which holds the patent on the process, and the inventors, both expressed a desire to share the discovery with industry.

It is believed that the process will make magnesium a practical alloy in the construction of the aircraft of the future as well as many thousands of articles to enhance the American standard of living.

DESERT BASE FOR FLYING BOATS

WITH the passing of the threat of Jap invasion, Australia has just raised its censor's ban on one of the best kept secrets of the southwest Pacific war — the existence of a huge inland flying boat base in the midst of an Australian desert.

In June 1942, Australia's defense was still in large measure dependent on the gallant crews of the PBY Catalinas, then flying thousands of miles to the north of the vulnerable mainland, to keep track of advancing convoys and evacuate troops from the islands in their path. Setting new range figures on these reconnaissance sorties, the PBYs also had the task of protecting the Australian convoys carrying reinforcements to New Guinea.

It was then, when the Australian seaboard was grimly threatened by the advancing Japanese, and U.S. aid was being rushed "down under" by every available means, that the Australian Government decided a flying boat depot was needed in the far south. Here aircraft could put in for repairs and servicing, even if the enemy eventually seized the vulnerable bases of the northern mainland.

Lake Boga, in Australia's most southerly state, Victoria, is almost a perfect saucer in shape. About two miles in diameter, it lies in the heart of the desert scrub country a few miles from Australia's most important river, the Murray. This lake, 14 feet deep and free of snags, was chosen as the site for the base where flying boats of the American, Australian and Dutch air forces could put in for repairs.

At a cost of over a million dollars, Australia built slipways, hangars, workshops, power-houses, and fuel stores, and created a town to accommodate more than 1000 men and women of the Royal Australian Air Force. The new town was grafted on to the old village of Lake Boga where, for some 30 years, the tiny population had never changed.

Around the lake were placed the hangars and workshops. Not far from where Rolfe Boldrewood wrote his world known saga of the Australian bush-rangers — "Robbery Under Arms" — rose the depot office, where the principal writing now is engineering statistics and the logging of flying boats passing in and out of the depot.

In the first six months, major repairs were completed on 14 aircraft. In the second 12 months, 75 flying boats from battle zones were repaired or rebuilt. In the first six months of 1944, over 90 aircraft were taken in and sent back to operational areas after major repairs.

As many American PBY crews will tell you, flying boats have often limped into Lake Boga after a perilous 1000 mile trip across land from Brisbane, repaired with bits of brass, shored up with timber inside, many of them with broken backs — result of desperate maneuvering to throw off attacking Zeros or ack-ack. Many of them were literally riddled with bullet and cannon shell holes.

At this Australian Air Force depot at Lake Boga they were entirely re-fitted, and often almost entirely rebuilt. When passed as operationally serviceable again, they returned to squadrons complete with all equipment from a needle to an anchor. This was the way we kept those planes in the war even in the days of the darkest Jap

Left: Signalling a Catalina as it comes in.

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Above: Catalina at Lake Boga is hauled up the slipway, after a test flight which passes it as operationally serviceable for its American crew.

threat to the great Australian mainland.

Today, knowing the strain on flying boats up north, repair crews often work through the night to have a craft repaired on schedule, so that another can be relieved before the strain becomes too great. Some of the PBYs have returned time and again to Boga.

Although now situated thousands of miles from current operations, Lake Boga is still very conscious of being a vital base in a war theatre. A large number of its men have seen service outside of the Pacific — many having served for long periods with flying boat squadrons of the Royal Australian Air Force which are based on Britain and in the Mediterranean.

There are girls working at the depot, too — members of the Women's Auxiliary Air Force.

They are engaged on instrument repairs, transport and fabric work.

Today, as the roar of thousand horse-power engines disturb the serene black swans which have lived in Lake Boga from time immemorial, Australians are thoughtful. Looking back on the last three years—the most difficult in their nation's history — they ponder on how lucky was Australia, thanks to her own sterling efforts and U.S. aid, that she managed to stave off the threat of Japanese invasion.

Like the swans, the PBYs leaving Lake Boga are painted black—for the night-long flights which American and Australian crews are now undertaking over Japanese bases in the north, where MacArthur's forces are striding over the Philippines on the road to Tokyo.

Tail Gunner: *"I'm always riding backwards."*

INTERLUDE, B-24

In the following pages, Plane Talk presents an unusual piece of war reporting.

Here, in a verbatim record, Sergeant Archer sets down the actual conversation and the personal thoughts of a Liberator crew which he accompanied on a bombing mission over Hollandia, Dutch New Guinea.

Hollandia was the strongest Japanese air base in the southwest Pacific until last summer, when the Fifth Air Force heavy bombers wrecked it. On the mission which Sergeant Archer records here, Liberators were followed by Mitchells. Lockheed Lightnings were escorts.

By Master Sergeant Jules Archer

Most of the eleven airmen in this experiment were veterans of 250 combat hours, and of 38 missions flown together. The procedure I used to collect their thoughts was to ask suddenly, after a period of silence on the interphone: "Right waist gunner, what are you thinking about?" All crewmen agreed, before the mission, to answer honestly.

Sufficient time was allowed to elapse between questions, to avoid the possibility of one airman's thoughts influencing another's. About once in ten times, a crew member when questioned would say his mind was blank at the moment.

I have transcribed the crew members' thoughts in italics.

Here is the roster of the crew:

PILOT: 1st Lt. Charles Koster, 22, stock clerk, Rochester, N. Y.

CO-PILOT: 1st Lt. Walter M. Severance, 19, student, Flint, Mich.

BOMBARDIER: 1st Lt. A. Warren Owens, 23, photographer, Atlanta, Ga.

NAVIGATOR: 2nd Lt. J. P. MacDonald, 22, cost recorder, Pittsburgh.

RADIO OPERATOR: T/Sgt. J. J. Hrivnak, 20, cook, Pursglove, W. Va.

PHOTOGRAPHER: T/Sgt. John Salek, 23, steel worker, Wheeling, W. Va.

TOP TURRET GUNNER: T/Sgt. W. P. Harrison, 23, auto mechanic, Ehrhardt, S. C.

NOSE GUNNER: S/Sgt. Ralph E. Bower, 30, ship welder, Sunbury, Pa.

L. WAIST GUNNER: S/Sgt. Herbert Pigors, 26, aircraft worker, Groton, S. D.

R. WAIST GUNNER: S/Sgt. Roger A. Schwartz, 23, farmer, Evansville, Wis.

TAIL GUNNER: S/Sgt. A. Braunstein, 19, shoe worker, Brooklyn, N. Y.

WE take off at 0740 hours. Most of us crowd on the catwalk in the bomb bay, among several thousand pounds of bombs, to make the tail lighter. After we are several minutes airborne, we take our respective positions in the plane, and put on our interphone headsets.

TAIL GUNNER (singing): B-rt-rt-rt-rt!! Rosie the Riveter!

PHOTOGRAPHER: Already we have trouble. What a voice.

TAIL GUNNER: Jealousy!

R. WAIST GUNNER: *Wonder if I ought to put my Mae West on today? Not much water to go over, just over the target.*

NOSE GUNNER: *Gotta write some letters when I get back. Don't write any, won't get any.*

TAIL GUNNER: *Only two ships behind us. Guess one didn't take off.*

TOP GUNNER: *Wish I had a plate of baked beans, the way Mom makes them.*

NAVIGATOR: *Good weather. Looks like a nice clean mission.*

CO-PILOT: *There's that waterfall, at five o'clock. Like to go see it sometime.*

PHOTOGRAPHER: *Beautiful country down there. Bet it would be pretty terrible to get through, though.*

BOMBARDIER: *Wonder if we get jumped today?*

L. WAIST GUNNER (Calling Pilot): There's a P-47 showing off at our left wing-tip.

PILOT (Calling Tail Gunner): Are there three ships behind us in the formation?

TAIL GUNNER: Only two. One on each side of us. Two more a little way back.

PILOT: See another five-ship formation?

TAIL GUNNER: I'll look around . . . Yah, Lieutenant. I see 'em.

PILOT: Rajah.

RADIO OPERATOR: *Good picture last night. Sure could use Betty Grable.*

R. WAIST GUNNER: *Ride back and forth so much, it's got so I know every landmark.*

TOP GUNNER: *If that screwball on the right gets any closer I'm gonna put my guns right on him.*

PILOT: *Guess I'll hook up my 'chute — close to the target. Might be rough.*

NOSE GUNNER: *Wish we'd turn around and head straight for Frisco.*

RADIO OPERATOR (Calling Engineer): Gas leak in the bomb bay. Try it out.

TOP GUNNER: Probably that hose again . . . It's all right now.

L. WAIST GUNNER: *Be fun telling the boys back home what it was like here.*

CO-PILOT: *Damn good formation today.*

R. WAIST GUNNER: *Boys are probably working in the fields now, putting crops in.*

PILOT: *Wonder what the hell happened? All the ships are in formation!*

NOSE GUNNER: *Happy day when I hit Frisco. Envy those guys with 300 in. Be happy myself, then.*

★ ★ ★

At this time, southwest Pacific air crewmen with 300 hours combat time were generally being sent home for a rest.

★ ★ ★

R. WAIST GUNNER: *How I used to hate the Old Man for getting me up in the morning to milk cows. I wouldn't now.*

PHOTOGRAPHER: *Wish we had a few more gravy runs, like Gloucester. That's the trouble; they start you off easy, and it gets harder.*

TAIL GUNNER: *Wonder how that malted's gonna taste at the PX? Just enough for a swallow, probably.*

NAVIGATOR: *'Round and 'round. Jeez, why don't we ever fly a straight course.*

PILOT: *The guy on the right's flying all over the place. Thinks he's a recco. One of these days a Zero will shoot his tail off.*

Liberator over Pacific target, riding through phosphorus-filled sky.

NAVIGATOR: *Three more hours to the target.*

R. WAIST GUNNER: *Those clouds! Like snow drifting over fences.*

RADIO OPERATOR: *Not much to think about. Marines had plenty to think about in Tarawa. Probably didn't though 'til it was over. Like us when there's action. Rather be up here, though, than down there.*

TAIL GUNNER: *Danger's worth it. This life's better than spit-and-polish in the States.*

TOP GUNNER (Calling Pilot): Check Number 2 engine. Oil coming out on top.

PILOT (Calling Engineer): Don't see it.

TOP GUNNER: Goddamit, if that ain't oil, I don't know oil.

L. WAIST GUNNER (Calling Engineer): If it was, you could see it on the tail. No oil on the tail, yet.

TOP GUNNER: Rajah.

CO-PILOT: *Wonder what the Japs think about when we come over?*

TOP GUNNER: *Like to have a picture of this formation to show my wife when I get home.*

TAIL GUNNER: *It'd sure be nice walking up Times Square now with a girl on my arm.*

RADIO OPERATOR: *Gee, my arse is tired sitting in this chair.*

BOMBARDIER: *I can always pick out my bomb bursts from the others. They look prettier, somehow.*

CO-PILOT: *Beautiful day. Everything going okey doke.*

TAIL GUNNER: *I'm always riding backwards. Everybody else but me and the engineer rides forward.*

PILOT: *Formation's outa shape again. Wish to hell they'd get back together.*

TOP GUNNER: *Like to get a Zeke today. Tell my wife all about it.*

BOMBARDIER: *Funny not seeing my own baby. Those snapshots are no good. Wonder what he looks like?*

NOSE GUNNER: *Ships ahead keep nice formation. Wonder why we're so lousy?*

PILOT (Calling Crew): Pilot to crew . . . Test fire your guns. Be careful of other ships.

★ ★ ★

The ship reverberates with thuds. Then the gunners report guns O.K.

★ ★ ★

R. WAIST GUNNER: Right waist gun's shooting like a hot mamma!

TAIL GUNNER (Testing for strafing, hits his head in turret): *Goddamit — Every time!*

NAVIGATOR: There's Kharkar Island. We're right on course.

R. WAIST GUNNER: *Getting cold. Better put my boots on.*

★ ★ ★

The ship bounces heavily as we get caught in propwash of leading formation.

★ ★ ★

PILOT: *Damn 'em. Wouldn't happen if they'd fly the right altitude.*

BOMBARDIER: *Wonder what guys think about when they go down?*

NAVIGATOR: *Only place in the world where you can navigate by the clouds.*

TOP GUNNER: *Sure'd be sweet to shoot a Zeke and see him explode.*

L. WAIST GUNNER: *Defense workers can't know what combat men think about.*

RADIO OPERATOR: *Wonder how I'd bail out?*

BOMBARDIER: *Where I have to sit, I never see a Zeke shot down.*

CO-PILOT: *Jeez — I'm hungry already. Probably corned willie when we get back.*

PILOT: *Wonder if Owens will hit the target today.*

CO-PILOT: *Rather take my chance going down with the ship than bailing out.*

TOP GUNNER: *Wonder what's for chow? I'm starved.*

R. WAIST GUNNER: *Used to read in the papers about the war over here. Now I'm in it. Whaddaya think!*

L. WAIST GUNNER: *Be over Wewak soon, I think. Better get guns ready.*

TAIL GUNNER: *Sure like to see our P-38's show up.*

BOMBARDIER: *Be nice going back. Shower. Hamburgers. And a coke. Wish Koster would turn on the heat.*

★ ★ ★

We're now at 9,500 feet. My fingers are beginning to tremble and I find it difficult to make my notes.

★ ★ ★

CO-PILOT: *Bombers all around us. Hate to be them poor Jap bastards today. Be something when we can take over a thousand bombers like in Europe.*

R. WAIST GUNNER: *Bet Ma has something good for dinner today. Always has.*

NAVIGATOR: *Wonder if those guys up front know where the hell they're flying those airplanes?*

RADIO OPERATOR: *That's A——— on the right. Hope Koster's watching him. I sure don't like the way he flies, especially in rough weather.*

L. WAIST GUNNER (Calling Co-pilot): Watch No. 1 engine on that ship at nine o'clock. He's throwing off puffs of smoke.

TOP GUNNER: *That bunch flies a hell-of-a-looking formation.*

TAIL GUNNER: That guy's feathered a prop now. He's veering to the right. *Worries the hell outa me when I see something like that.*

BOMBARDIER (Calling Navigator): How far to the target?

NAVIGATOR: Fifty-five minutes — 165 miles. We'll be there about 1107, if we don't go too much 'round and 'round.

BOMBARDIER: How fast will we be going over the target? What air speed?

NAVIGATOR: Look, all I know is we won't be there until 1107 — maybe not then.

R. WAIST GUNNER: *Funny, the way nature makes clouds like animals. That one's a cattle dog. That's a cow. There's a hog.*

TAIL GUNNER: *Whee — ! Here comes the P-38's. About time!*

BOMBARDIER: *Hope there're no damn clouds over the target. I'm sick of clouds ruining my runs.*

PHOTOGRAPHER (Calling Navigator): P-38's all over the place! Where we at now?

NAVIGATOR: Little way below Wewak.

★ ★ ★

We can see Lockheed Lightnings playing around high above. Some glint like white gnats, some like black, depending on how they wheel and bank in the sun.

★ ★ ★

TAIL GUNNER: *Keep my eyes open from here on.*

NOSE GUNNER: *Guns pointed right at that cloud. Ready if they come through.*

PILOT: *Ship with feathered prop must have gone home. Don't see it in the formation.*

NOSE GUNNER: *Hope we shoot up some ships at Hollandia. Like to go down and strafe — have a little fun. Be swell to sink a transport.*

BOMBARDIER: *B-25's are following in after us. Hope we do a good job, and make it easier on 'em. I got friends on the Mitchells.*

TAIL GUNNER: Ship behind us has landing lights on.

NAVIGATOR: Maybe he thinks the ack-ack needs lights to aim at us better.

L. WAIST GUNNER: Naw. He's just planning a snow job; wants to tell 'em the ack-ack was so thick he had to turn on his lights to see his way through.

★ ★ ★

"Snow job" is G.I. for newspaper publicity.

★ ★ ★

R. WAIST GUNNER: *Native villages down there. Uncivilized. Must be an awful life. Nothing to look forward to. Be there till they die.*

NAVIGATOR: Fifteen minutes more to Hollandia.

BOMBARDIER: *Wish they'd get somebody in the outfit who knows how to run that movie projector. Breaks down every time.*

CO-PILOT: Two P-38's at nine o'clock. Two at three o'clock. Two at six. Jeez — P-38's all over the joint!

PILOT: *Won't be long now. One flight turning out to the ocean.*

TAIL GUNNER: *Here come the B-25's and A-20's. They're early. Guess they'll circle here until we clear out.*

RADIO OPERATOR: Any interception today? Boys, we're just tail-end Charlies.

NAVIGATOR: If we get intercepted, it'll be in about half an hour. That, gentlemen, will be just about 9:45 o'clock last night back in Pittsburgh.

CO-PILOT: Let's keep Pittsburgh the hell out of this.

NOSE GUNNER: That island looks like Pittsburgh. Can you make out what's burning?

PHOTOGRAPHER: Can't tell. Smoke looks like a ship.

★ ★ ★

Now we are at 10,800 feet, the cold is intense, and my fingers are numb. I don't make any notes for a while. I leave the flight deck a few minutes before we reach the target and make my way gingerly through the bomb-bay to the waist windows. The Photographer hooks a parachute around me. Leg straps won't fit, so I let them dangle. There isn't any time.

★ ★ ★

PHOTOGRAPHER: Don't be nervous, chum. You probably won't have to use it.

R. WAIST GUNNER: That's Tadje over there. We wrecked that last week.

L. WAIST GUNNER: Here we go. You'll get a better view if you sit over the belly gun hatch.

It is 1131 hours. Photographer straps himself to sides of bomber like a window cleaner, leans over his hatch with his long camera. I crawl to the belly gun hatch, lean over and peer down. Waist gunners are taut at their guns, scanning the skies. Suddenly I see the bombs of the flight ahead explode beneath me. Snapping, crackling sounds assail my ears. Jungle settlement below is covered with red darting flashes. Like a spilled box of matches, one instantly igniting the other. Toadstools of smoke spring up from the stabs of flame.

I am startled again when our own bombs fall away beneath my nose, forming a design like end-papers for a book. There is a faint wiry, twiny sound as arming wires rattle loosely in the wind-swept bomb-bay. I lose sight of the bombs in a cloud, after watching their vanes spin off. Later the flight behind us informs us we smashed a jetty and warehouse, all bombs on the target. There is anti-aircraft fire coming up, but it bursts harmlessly short of our altitude. I think of the briefing of our mission, when an officer said, "Keep an eye open for Superior Private Second Class Yasha Tamayamo. He really throws it up at you — he's bucking for Superior Private First Class."

As we pull away from the target, we see rising about 15,000 feet three huge columns of smoke, two black, one white and elaborately curled like a Madame Pompadour wig. I return to the flight deck.

★ ★ ★

PHOTOGRAPHER: Boy, that was funny. No interception at all.

R. WAIST GUNNER: I was all set for it. What the hell. I've had some shots at a Zeke. You never did, Braunstein.

TAIL GUNNER: Horsefeathers.

TOP GUNNER: Any ack-ack guns down there?

PILOT: Clouds hid 'em. But there were puffs from the warehouses.

PILOT (Calling Bombardier): Pilot to bombardier. Come up here, will you?

BOMBARDIER: Bombardier to pilot. Rajah.

★ ★ ★

The Pilot and Bombardier discuss probable bombing results between themselves.

★ ★ ★

TAIL GUNNER: *Worse part's over. Rest is a cinch.*

TOP GUNNER: *Damn it. I'm goofed off. Didn't get a Zeke today. Didn't even see one.*

CO-PILOT: *Not enough excitement over the target. Nothing going on. I'm hungry. Long time before we eat.*

RADIO OPERATOR (Sending report): *Hope this gets through way I'm sending it.*

R. WAIST GUNNER: *Tickles pants off me to see those fires back there.*

NOSE GUNNER: Nose Gunner to Bombardier. Get me out of this damn turret. My back's breaking.

TAIL GUNNER: Tail Gunner to Co-pilot. Can I open the turret door? I'd like to straighten up.

CO-PILOT: Co-pilot to Tail Gunner. Okay. Co-pilot to Nose Gunner. Bombardier's coming right down.

NAVIGATOR: Just think — boys in camp are eating chow now.

R. WAIST GUNNER: Yeah, but there's a lotta Japs ain't gonna eat no more at all.

RADIO OPERATOR: *Guard duty tonight. Isn't fair. Not after a mission.*

BOMBARDIER: *Like missions like these, where we hit target. Praying photographer got those pictures.*

NOSE GUNNER: Can't figure out why we didn't even see a Zero.

PHOTOGRAPHER: American Air Corps, boy, that's why. Best damn Air Corps in the world.

R. WAIST GUNNER: *Wish my brother could have been along today. He'd have gotten big kick out of it.*

★ ★ ★

S/Sgt. Schwartz's brother is a Diesel worker for the Navy.

★ ★ ★

L. WAIST GUNNER: How'd you like to go dancing tonight, Braunstein?

TAIL GUNNER: Sure. You could dance with the abo's.

★ ★ ★

"Abo's" is G.I. for Aborigines.

★ ★ ★

R. WAIST GUNNER: Remember that beautiful babe I met at that dance in Salt Lake City? Could she shake it!

NOSE GUNNER: You mean one of them burlap sisters?

L. WAIST GUNNER: Sure! The old bag.

TOP GUNNER: *Wish we take rest of our missions in this ship. Good turret.*

Members of Liberator ground crews, waiting for their ships to come in.

NAVIGATOR (Adding distances): *120 . . . 125 . . . 115 . . . 320 . . .*

TAIL GUNNER: *Nice to be going back, instead of up.*

R. WAIST GUNNER: *How happy my folks'll be when I come home.*

PILOT: *Hope we make a good landing.*

L. WAIST GUNNER: Wish I had my foot up on a saloon rail right now.

NOSE GUNNER: When you go into a bar, pal, the devil goes with you.

L. WAIST GUNNER: If he goes with me I'll stick him for the drinks.

NAVIGATOR: Flash! Message for Hirohito — blow it out!

TAIL GUNNER: Redyo Tukyo calling: Three hundred Zeros intercepted American force, destroyed all B-25's, shot down

A snapshot of the Liberator men in this story. Left to right, back row: Koster, Severance, Owens, MacDonald, Hrivnak, Archer. Second row: Braunstein, Schwartz, Pigors, Bower, Harrison. In front: Salek.

71 heavy bombers. Japanese lost one wing bolt. Thank you much.

NAVIGATOR: Yeah! and how about us: "And now we bring you the latest news. One hundred Liberators take off; 200 return safely. A great day for Uncle Sam!"

TOP TURRET GUNNER (singing): Off we go into the bright blue yonder —

★ ★ ★

Everybody joins in except the Co-pilot, who makes noises like an airplane engine sounds on the radio. They sing several songs — Wabash Cannonball . . . Me and My Gal . . . Bicycle Built for Two . . . Know any ladies who want any babies? Send 'em to me, bless 'em all.

Finally all is quiet. Everyone is bored. There's an hour or so of silence.

★ ★ ★

R. WAIST GUNNER: *Engines rumble nice. Like a train.*

BOMBARDIER: *Damn well hope those pictures come out.*

R. WAIST GUNNER: *Be nice to telephone Ma. But I don't have to hear her voice and she don't have to hear mine. Think of each other anyhow.*

TAIL GUNNER: *B-24's look nice in formation. Powerful as hell.*

PILOT: *Beautiful day out there. Nice clouds. I'm hungry.*

NOSE GUNNER: *Funny. Japs not sending any fighters up.*

TOP GUNNER: *At least one letter from my wife. Even a V-mail.*

PHOTOGRAPHER: *Jeez, I'm tired. Won't we* ever *get back?*

CO-PILOT: *Be nice having a crew of my own some day.*

PHOTOGRAPHER (Imitating Pilot's voice): Pilot to Tail Gunner. Over.

TAIL GUNNER: (Momentarily fooled): Tail Gunner to Pilot. Go ahead.

PHOTOGRAPHER: Blow it out your nose!

TAIL GUNNER: I can't you louse. I'm the Tail Gunner. You want the Nose Gunner.

★ ★ ★

This gives everybody an idea, and so everyone pretends for awhile to be somebody else — usually, of course, the Pilot.

★ ★ ★

RADIO OPERATOR: Pilot to crew. I want one volunteer to climb out on the wing and brush those flies off.

NOSE GUNNER: Radio Operator to Pilot. May I volunteer, sir?

PILOT: Pilot to Engineer. Get out and put some grease on the wheels. I want a smooth landing.

CO-PILOT: Check the landing gear. If it isn't up, put it up. If it isn't down, put it down.

NOSE GUNNER: I'll check the nose wheel. If it isn't locked, I'll use the key.

NAVIGATOR: Leave the nose wheel up. I want a Purple Heart.

★ ★ ★

Now we come over our base. We take our place in the traffic pattern and keep cruising.

★ ★ ★

TOP GUNNER: Engineer to Pilot. Hydraulic fluid leaking out. Nose wheel won't lock. Better go down and check it.

★ ★ ★

He isn't kidding. We are forced to stay in the air until the nose wheel is finally persuaded to lock. Even then we get the red light six times on attempting to land, as other aircraft get priority.

★ ★ ★

PILOT: *Damn P-38's — always in the way. I'm starved.*

L. WAIST GUNNER: *I like landings, not take-offs. No bombs to sweat out.*

R. WAIST GUNNER: *Bet Ma gets a feeling right now I returned safe.*

CO-PILOT: *Never feel how tired I really am until it's all over.*

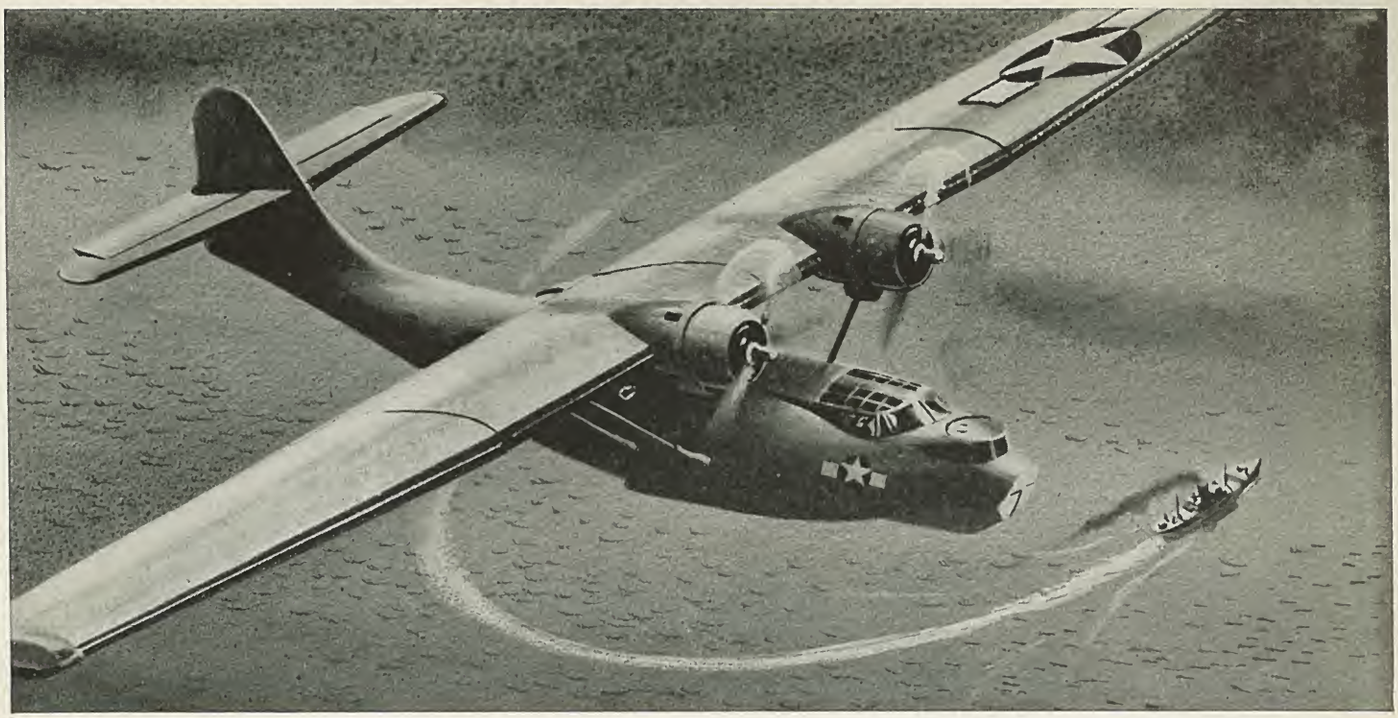
RADIO OPERATOR: *I'll get through my missions all right. I'm lucky.*

★ ★ ★

We land at 1530 hours, almost 8 hours airborne. Pilot taxies into our revetment and bomb-bay doors slide open.

★ ★ ★

TAIL GUNNER: All tickets please! Hey, Schwartz, you chow hound! Wait for me!



Too busy to retire

The first Catalina was made in 1934.

One of the world's first all-metal flying boats, the "Cat" was the fastest plane in its class for almost six years.

But beginning around 1939, the Catalina was retired—about three times a year. She was retired by the press. She was retired by Congressmen. She was retired by chairborne experts of all types and shapes.

She was retired by everyone but the men who flew her!

In their hands she was driving the Nazi subs away from the sea lanes to Great Britain. She was helping to sink the Bismarck. She was flashing the report that began the Battle of Midway. She was mauling the Jap in the Aleutians. She was rescuing pilots and crews all over the vast Pacific. She was deviling Jap shipping to a virtual extinction. Just recently, in fact, a "Cat" sank 4 Jap ships on a single flight!

No, the Catalina isn't ready to retire yet.

There's too much horizontal bombing, dive bombing, fighting, strafing, reconnoitering, photographing, scouting, patrolling, and torpedoing left to be done.

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